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The Consumer and Transportation:

An Investigation of Consumer Perceptions Towards Transportation

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PREFACE

!

This study has been undertaken by the Institute of Urban Studies of the University of Winnipeg under a contract from Consumer and Corporate Affairs Canada. The contract was awarded as part of the Consumer Behaviour and Energy Conservation research program.!

!

The work undertaken is the responsibility of the Institute of Urban Studies with Robert Fenton and Jeremy Hull acting as the principal investigators. We wish to acknowledge the assistance of the cooperating employers and their employees: AEL Microtel, Great West Life Assurance Company, Northern Telecom, and Winnipeg Photo as well as the Winnipeg Transit System and the Department of Streets and Transportation of the City of Winnipeg. The staff and associates of the Institute of Urban Studies were widely involved in the analysis. In particular, recognition of A. Basilevski, J. Hilton, J. Verkley and J. Gunn is appropriate. Many thanks to Evelyn Edwards for her skill and patience in handling a difficult text preparation task.!

EXECUTIVE SUMMARY

The Consumer and Transportation study concludes that a potential exists for the marketing of shared transportation modes for the journey to work. These modes should be non-capital intensive and responsive to specialized demands. The alternative mode would be geared to the needs of particular groups of employees from among employers located at a specific, well defined, work location.

The need for responsiveness to a range of demands and needs suggests that the service be designed around relatively small capacity vehicles. Alternative routings and potential for flexibility of departure times would add to the attractiveness of the service.

The study also concludes that the development and marketing of this service must be done in conjunction with extensive trials and demonstrations of the service and technology. Attitudes and perceptions towards potential modes are correlated with current modes for the journey to work. The correlation is highest between the auto driver and mode characteristics reflecting door-to-door transport and immediate availability of the vehicle.

These conclusions arise from a pilot study of employees working at two locations in Winnipeg conducted during November of 1981. The total number of employees at the two locations exceeded 2500.

At the downtown location, more than 1100 employees of the Great West Assurance Company completed the questionnaire. The Great West Life location is served directly by a number of main bus routes. Several other routes pass within several blocks of the company's location. The company has over the years organized access to parking for employees. Parking availability will be reduced in future years.

At an established suburban industrial park, more than 300 employees of three different firms completed the questionnaire. The three firms, Winnipeg Photo, Northern Telecom and AEL Microtel are located in close proximity in the industrial park. Bus service in the industrial park is limited and connections to distant locations are difficult. Parking is generally available on the employers' plant sites.

The research utilized the case study approach to examine two hypotheses. First, it was hypothesized that attitudes and perceptions towards the trip to work are not uniform or random but are significantly affected by the consumer's socio-economic status and travel patterns. Second, it was hypothesized that current attitudes and perceptions are strongly influenced by existing options.

Both of these hypotheses, if true, would indicate that the market for transport services for the trip to work may be highly segmented by employment location and employee activity. In this situation, a case study approach to planning, similar to the methodology used in this study, may be an appropriate alternative to current methods of research.

The research questionnaire was a self-administered instrument distributed and collected through the internal processes of the four participating employers. The questionnaire consisted of four major subdivisions:

- First, questions on the number of times each of four modes was used during the preceding week and the number of times side-trips for specific purposes were undertaken.

- Second, questions concerning reasons for use of current modes, information concerning availability and cost of alternate modes and nature of major dislikes concerning the current major mode.
- Third, information concerning the strength of preference toward characteristics of an ideal mode including identification of the three most important characteristics of an ideal mode.
- Finally, questions concerning the socio-economic situation of the respondent. This section includes questions about availability of automotive vehicles in the respondent's household and identification of the respondent's home postal code.

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!

These conclusions arise from an analysis of the results of a survey of employees of four firms at two different locations in Winnipeg during November of 1981. The total number of employees at the locations exceeded 2500.!

!

More than 1100 employees of the Great West Life Assurance Company located in the downtown core of Winnipeg, completed the questionnaire. The Great West Life location is served directly by a number of main bus routes. Several other routes pass within several blocks of the company's location. The company has over the years organized access to parking for employees. Parking availability will be reduced in future years.!

!

More than three hundred employees of three firms located at an established suburban industrial park completed the questionnaire. The three firms, Winnipeg Photo, Northern Telecom and AEL Microtel are located in close proximity in the industrial park. Bus service in the industrial park is limited and connections to distant locations are difficult. Parking is generally available on the employers' plant sites.!

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1.0 INTRODUCTION!

This study arose from the growing concern in Canada over energy use and conservation. It deals with the journey-to-work in Winnipeg, which is one of our major consumers of energy. In particular, the study has been designed to identify sub-groups among the working population which might be more responsive to energy conservation efforts. The intensive survey of employees of four firms provides a data base useful to the design of relatively inexpensive alternative systems and offers a methodology for use in other cities.!

!

The research project was based on two hypotheses. First, it was suggested that attitudes and perceptions towards urban transportation are not uniform or random, but are significantly affected by the consumer's socio-economic status and travel patterns. Second, it was hypothesized that current attitudes and perceptions are strongly influenced by existing options. Both of these hypotheses, if true, have implications for the development of transportation policy and programs, whether by individual employers, urban municipalities, provincial or federal government. The findings of this study have a particular bearing on such public policy questions as urban design, the structuring of mass transit systems, and the forms which our response to higher gasoline costs will take.!

!

1.1 Transportation Policy Issues!

On the broadest level, questions are raised about how we organize our cities. This study documents, for instance, the average travel times between people's homes and workplaces. These are a function of the historic development of the city, the affordability and quality of housing in particular neighbourhoods, the income levels of various occupations, and the transport system.!

!

In Winnipeg, as in many other cities, the largest concentration of jobs continues to be in the downtown area (about 25% of all jobs in 1976), but the immediately adjacent residential areas have been abandoned by many workers, as the core area has deteriorated, thus increasing the distance they travel to work. Increasingly, too, workers have been attracted to suburban job locations as employment opportunities have multiplied in these peripheral areas of the city.!

!

The city's proposed development plan, Plan Winnipeg, has begun to deal with some of these spatial development issues and demographic shifts. At the same time it is clear that the city's workplace and residential patterns will not be changed dramatically in the short run. Therefore, the study's focus on possible non-capital intensive alternative transportation modes is appropriate. Further, by steering away from the more expensive, capital intensive transit systems, a great deal of flexibility in transportation services can be maintained. Thus, if urban redevelopment is ultimately successful, the transit system will not be burdened by redundant, partially amortized capital facilities.!

!

A second aspect of urban design which might be affected by a re-oriented transportation system, is the proportion of urban land presently devoted to use by the automobile. If new forms of transportation are effective in increasing the number of shared vehicles used on the trip to work, or in increasing the use of various public transportation modes, then downtown traffic volume will decrease, reducing demand for traffic lanes and parking. The additional availability of land will enhance the central city environment and stimulate resettlement of the Core. (These objectives are central to the recently approved Winnipeg Core Area Agreement,).!

!

Another set of policy issues addresses questions of how we collectively or individually respond to the increased cost of gasoline. In general we can choose from three alternatives: to change our behaviour and social organization to become less dependent on the private automobile, to build and buy more cost efficient automobiles, or to reduce our other expenditures. Potential savings are greatest with the first of these options, but it is also the most difficult option to put into practice.!

!

For example, the most obvious response to the cost increases has, thus far, been to opt for smaller, more fuel efficient cars. The public demand for such cars has had a profound effect on the North American automobile industry since the late 1970's. It may be that we will see a similar pressure develop for good housing in closer proximity to the workplace. On the other hand, this study documents the existence of a significant proportion of work trips by shared automobile, despite the lack of organized public support for such an option. It suggests that the potential exists for change in people's work-trip behaviour. Various of the particular characteristics of current work-trip behaviour have been explored in this study, which together with stated preferences reveal possibilities for transportation policy development.!

!

However, one of the difficulties with developing new direction in transportation policy is that consumer choices are a product of available options. It is therefore risky to recommend entirely new options since there is no experience of demand for them. Therefore, while this study specifies the characteristics of transportation modes required by certain groups of workers, it is not until a wider range of options are offered within given contexts that demand can be properly assessed. For this to occur, resources should be made available for pilot projects to test public response to as yet untried alternatives. They should also be professionally marketed and given sufficient opportunity for the public to become familiar with them.!

!

The present state of urban public transportation presents certain impediments to the development of alternatives. In part, this has to do with cost and budgetary considerations, but more important is the way in which mass transportation is now habitually perceived. With the apparent freedom and flexibility of the private automobile dominating Canada's travel patterns, public transit has been commonly regarded as a second choice even by those not able to afford or use a car. The transit system is organized as a set of fixed route schedules designed to serve the greatest number of passengers, while providing as comprehensive a coverage of the city as possible within budgetary constraints. More recently, the advantages of the automobile have begun to be unfavourably balanced against the costs. Both the individual owners and the community perceive costs such as urban congestion, road construction, resource depletion and car and road maintenance, as excessive. Transit, as an alternative mode of transportation is receiving greater attention.!

!

Some experiments have begun which could broaden the range of public transit options available. The needs of the handicapped have received some attention in the form of specialized buses. Flexible dial-a-bus systems have been introduced. Other groups are beginning to identify specialized service needs. For example, in Winnipeg, the Age and Opportunity Centre is currently assessing the transportation needs of the "mobile elderly". Barriers such as cost, winter weather and distance to bus stops are being considered in relation to the needs of the elderly for both independence and social activity.!

!

The traditional mass transit approach lacks the sophistication and variety of options to deal with this range of more specifically defined transportation needs. Yet, urban transportation planning is still dominated by the binary choice model of the car versus the bus.!

!

The present study explores the possibility of providing transport alternatives for the trip to work, addressing such questions as: Is the trip to work a multi-purpose trip? Are there groups of employees travelling much the same route who are not adequately served by existing transportation options? Can alternatives be devised which satisfy both the workers' basic needs and their stated travel preferences?!

!

The study addresses these issues for a limited sample of Winnipeg's working population. Designed as a pilot study, it involved employees in two locations. One sample group consisted of a large downtown company's employees, and the other group was made up of employees of three smaller companies in an outlying industrial park. Thus, both the rush hour downtown radial flow, and reverse commuting and peripheral flows have been examined. The project's specific objectives are as follows.!

!

1.2 Objectives!

The general objective of the study was to examine attitudes and perceptions of limited populations towards urban transit options. This can be elaborated into the following more specific objectives:!

1.21 To examine the structural and behavioural determinants of the service elasticity of demand for urban transit in a peripheral reverse flow commuting situation and a rush hour downtown radial flow situation.!

1.22 To investigate the relative strengths of these determinants in order to better design transit service delivery.!

1.23 To develop a pilot methodology which can be applied in cities of similar size or smaller than Winnipeg which have limited potential for high cost, capital intensive, technologically innovative public transportation systems.!

2.0 A SELECTIVE OVERVIEW OF PREVIOUS RESEARCH!

!

2.1 Introduction!

This section of the report offers a selection of works from the very large body of literature on urban transportation which addresses the themes being emphasized in this study. Where relevant, methodological approaches are considered. A second goal is to indicate where the Institute's research appears to diverge from the bulk of previous analysis. The selective overview of the urban transportation literature provides a comparative base or perspective in which the present work can be set.!

!

The overview of relevant literature will be organized around those elements emphasized in the first section of this report: energy use and conservation in relation to the trip to work; the behavioural and structural determinants of the service elasticity of demand for urban transport; the development of new urban transportation options; and locational aspects of urban transportation mode study. First, however, a brief overview of a predominant topic in the urban transportation literature, the 'mode-choice model', is presented.!

!

It is apparent from the literature on urban transportation modes that modal choice models and their construction and refinement are widely discussed. They therefore deserve some brief examination here. Some notable recent examples are Hanna et al (1979) who present the results of a binary choice disaggregate behavioural split model formulated for Ottawa-Hull; Transport Canada (1979) who examine and compare in detail current travel mode-choice modelling found in seven Canadian cities; as well as Foerster (1979) who argues that transportation planners should go beyond the traditional construction of linear combinations of travel mode attributes and examine the decision models being developed in 'evaluation process' research. Prashker (1979a) creates a model which attempts to identify the effect of reliability-performance measures on the individual choice decisions; Train (1979) compares the predictive ability of complex mode choice models versus models with fewer variables; and finally, Yering et al (1979) attempt to create an improved mode-choice model through the introduction of a weighted income variable representing household consumption economies of scale. Such research is impressive. However, it is also representative of the theoretical nature of so much of the work being done in the urban transportation field at present. The thrust of the research in this project clearly diverges from the bulk of existing research. The goal of this study is operational planning rather than theoretical.!

!

2.2 Energy Use and Conservation and the Trip to Work!

As was indicated in the previous section, this study emerges from the growing concern over efficient use of energy resources and focuses on how this issue relates to the urban trip to work. Thus it would seem worthwhile to note the type of research which has been undertaken in recent years concerning urban transportation and energy conservation. Fels and Munson (1975) examine possible energy consumption patterns for urban passenger transportation to the end of the century; Hannon et al (1975) utilize input-output analysis to "...calculate the total energy impact of different transportation modes, along with dollar costs (to the consumer) and employment impacts of both intercity and urban transport modes" (p. 105), with the urban modes being the bus and the automobile; Smylie (1975) evaluates the energy consumption of six alternative public transportation systems; and Campion (1975) focuses on areas within the sphere of urban public transportation in which to concentrate energy conservation efforts. Similarly, Miyazaki (1977) examines a number of urban transportation options in terms of the energy conservation theme. What would seem to separate the Institute's study from these works is the emphasis on the human element rather than physical concerns. It attempts to identify sub-groups within the urban population who may be more responsive to energy conservation concerns as they relate to transportation.!

!

As stated above, the trip to work represents the focus for analysis in this study. Hanson (1980) provides an indication that, in this matter, the project is very much in line with the work of the majority of urban transportation researchers:!

> The trip that has received the most attention from urban transportation researchers has been the journey to work. Interest in the daily commute springs from the fact that this is a highly repetitious and therefore highly predictable trip. Also the journey to work places the greatest strain on the urban transportation system due to its temporal peaking. (p. 229)!

!

2.3 Structural and Behavioural Determinants!

Behavioural determinants (attitudes and perceptions) represent a common theme in the urban transportation literature. Obviously, these determinants are important to the development of the aforementioned mode-choice models. However they have not been viewed by researchers strictly within the confines of such models. For example, Belohlav and Shell (1980) focus on attitudes in their examination of factors influencing urban mass transit usage and find that the four attitudinal variables rank among the five most significant; Luebring and Selby conduct an attitudinal study of single occupancy drivers and find that the major driver obstacle to public transit use is convenience. Smith (1969) finds in his study, that there are significant differences between attitudes of car drivers and transit riders with respect to convenience, comfort and cost. Interestingly, Dumas and Dobson (1979) in their examination of consumer attitudes find that, at least for bus users, image of the mode influences behaviour over and above the influence of rated convenience and comfort. These few examples help illustrate the kind of emphasis placed on attitudinal factors within the literature, as well as indicating the great difficulty facing researchers in attempting to determine the relative strengths of such factors.

In this study, attitudes and perceptions are viewed in terms of socio-economic factors and travel patterns, themes which again are represented to some extent in the literature. Some examples of treatments of the first theme are: Prashker (1979b) who in his examination of the perceived importance of reliability attributes, attempts to identify homogeneous population groups on the basis of socio-economic charactersitics such as sex, age, income, level of education, family-life cycle state. Prashker's study also shows mode of travel to be an important variable in determining perceptions. Smith (1969) finds responses are apparently independent of socio-economic household factors in his examination of user attributes relative to transportation system attributes, with subjective preference of the user being the only reason for choice of either transportation mode. Manning (1978) examines main mode to work on the basis of family income and finds that "...the proportion of trips undertaken by the car increases with family income, while the proportion by train stays constant and the proportion by bus decreases." (p. 141) However, socio-economic factors are probably most commonly examined in the literature as facets of mode-choice models. As Hanna et al (1979) point out in this regard, "Earliest attempts at the behavioural demand modelling were based on the premise that individuals make travel choices by comparing the level of service provided by alternative transportation modes. Subsequently, these models were modified by adding the socio-economic characteristics of travellers." (p. E44) Nevertheless, it is interesting to note that according to Transport Canada (1978) in the case of seven major Canadian cities, only Winnipeg's mode-choice model '...explicitly simulates the effect of traveller socio-economic characteristics on modal split." (p. 53)!

!

Turning to the theme of travel patterns, Hanson (1980) provides a study which focuses on this concern, specifically the journey to work as a multiple purpose trip. She illustrates the "...importance of the multi-purpose work trip in the overall pattern of the urban household." (p. 229) Hanson provides a clear indication that while subjects such as route choice have received attention by researchers, the multi-purpose element of the work travel pattern theme has been paid very little heed to date:!

> ...only recently have researchers explicitly recognized the journey to work as part of a multiple purpose trip or addressed the question of trip structure, i.e., the activity linkages associated with the work trip. In particular, there is very little empirical work that examines the travel undertaken for non-work purposes in conjunction with the journey to work. (p. 229)!

The present study represents an empirical piece which does examine the multi-purpose work trip.!

!

It does not appear that the thrust of the study's second hypothesis - that attitudes and perceptions toward urban transportation will be determined by existing options - has received much attention in the literature. Nevertheless, it can be pointed out that the bulk of the urban transportation mode-choice literature, particularly that of transportation planners, is based on a bimodal split between the private automobile and public transportation. For example, Transport Canada (1979) makes the observation that "Mode choice models characteristically focus on the two dominant modes of urban travel: public transport, and the automobile." (p. 1) Emphasis on the bimodal split cannot be viewed as surprising as such a split has largely reflected the reality of available transportation modes. The present study will examine the extent to which attitudes have been coloured by this reality.!

!

2.4 The Development of New Options!

A third objective of this study is to assist in the development of new, marketable and flexible transportation alternatives on the basis of the findings about attitudes and perceptions of limited populations of consumers. Despite the predominant bimodal emphasis in the literature, research has been undertaken which focuses on alternative modes. In their review of the 'state of the art' in the area of non-capital intensive transportation options, M. M. Dillon Ltd. (1978) discuss alternative modes such as paratransit (pooling) and walking and bicycling. Concerning paratransit, Dillon make the following observation: "It is well accepted that the problems of paratransit often require more procedural innovations than technological improvements, more skilled management than highly developed production techniques, and more common sense than greater scientific discovery." (p. 244) Hartgen (1977) reviews recent findings specifically from ridesharing and carpooling research and discovers that attitudinal differences between carpoolers and non-carpoolers are quite weak. 3M Canada (1980) outlines their experience with a 'full-fledged' vanpooling project in London, Ontario and assert "Significant transportation, environmental, and energy benefits have been achieved as a direct result of 3M's Commute-A-Van

Program." (p.i) Chrysler Canada (1979) provides a vanpool operations guide for employers and sets out some of the experience Chrysler has gained in this area. What is particularly significant about these latter two pieces is that they relate the results of direct corporate action in the urban transportation field. The company-specific and employer-supported aspects of this study lead logically to consideration of alternative options which, as with the Chrysler and 3M examples, are specific to and sponsored by particular firms.!

!

2.5 Locational Features!

A final notable point about this study vis-a-vis the literature concerns its locational aspects - the fact that it centres on specific employment locations rather than zones and that it examines a reverse flow work trip to a suburban locale as well as the trip to the Central Business District (CBD). The literature does provide some cases of comparisons of non CBD to CBD work trips [for example, Manning (1978)], but such comparisons do not appear to be particularly common. The specific employment location feature of this study would appear to be a fairly unusual quality of the Institute's research in comparison to analyses which has been conducted to date. Hanson (1980) provides support for this perspective as she points out that in traditional transportation data "...origins and destinations are coded to zones rather than points." (p. 231)!

2.6 Conclusions!

The objective of this overview of a sampling of relevant works has been to provide examples of articles which address the major themes found in this study and to note the particular qualities of its research which appear to differentiate it from the predominant thrusts of the majority of literature. These qualities are the planning and operational (as opposed to theoretical) objectives of the study; the focus on the human (rather than physical) element in regard to energy conservation through urban transportation; the emphasis on the effects of travel patterns and existing options on attitudes and perceptions towards urban transportation; the attempt to look beyond the bimodal split at new modal options; and finally, the examination of the work trip in terms of specific employment locations rather than on a broad zonal basis.!

3.0 METHODOLOGY!

Based on the specific objectives listed in section 1.1, several research questions were developed which guided the research process and analysis. These research questions, in turn, provided the basis for defining our data requirements and for assessing alternative data sources.!

!

3.1 Research Questions!

For the purpose of identifying research questions, the study's objectives were broken down in greater detail. First, the study was to examine structural determinants of consumer travel preferences. These structural determinants are the transportation choices available to consumers. Based on this objective, the consumer's travel preferences are evaluated in light of the options available. It can be assumed on the one hand that present travel choices are, by definition, real travel preferences given present options, but on the other hand they influence individuals' perceptions of their preferred ideal travel characteristics. How do present travel choices correlate with the availability of existing options (controlling for the influence of other independent variables)?!

!

A second objective was to examine the behavioural determinants of service elasticity of demand. The term behavioural determinants refers to present work-trip behaviour, which reflects real preferences as noted above, including those preferences based on other-than-work functions of the trip to work. How do consumers presently get to work? What other activities are associated with the work-trip? How are these characteristics influenced by the individual's socio-economic characteristics? How do consumers' stated travel preferences correlate with these behavioural characteristics?!

!

The third area of inquiry sought to identify differences in mode option which might exist between those working downtown and those employed in an outlying area. Are there differences in opportunity set and socio-economic characteristics between these two groups of employees? What differences in their travel patterns are apparent? How do these behavioural and structural differences influence stated travel preferences?!

!

A fourth issue was to identify groups within the general population which might be more receptive to travel options other than the car or bus if these were available. Are there clusters of employees whose stated preferences indicate a desire for other travel options? How might these groups be accommodated?!

!

3.2 Data Requirements!

Based on these research questions the need for specific types of data was identified. These may be divided into four general groups: Travel Characteristics, Travel Preferences, Personal Characteristics, and Employer Characteristics.!

!

3.2.1 Travel Characteristics!

In order to assess the influence of currently available options on behaviour, data was required on travel mode and frequency, travel time, cost, and other functions linked to the trip to or from work. Further, it was decided that data expressing consumers' perceptions of convenience and the advantages and disadvantages of their present travel mode would be helpful in clarifying the interaction between travel options, present modes and preferences.!

!

3.2.2 Travel Preferences!

In assessing travel preferences data were needed which throw light on the characteristics preferred by consumers. In this way it might be possible to isolate specific preferences which govern consumers' present decision-making. Knowing these preferences could lead to definition of one or more alternative modes which would represent a substantially improved option for segments of the population. The relative importance of cost, convenience, travel time, and amenities, etc., as determined by the study, would be useful in the evaluation of alternatives.!

!

3.2.3 Personal Characteristics!

The data required here would have three functions: identifying independent variables which would have to be controlled for in the data analysis; providing a basis for defining sub-groups of consumers who might have similar preferences; and establishing residence location in order to identify individuals' transportation opportunity sets. It would include information on age, sex, family composition, income, occupation, residence, education, and automobile ownership.!

!

3.2.4 Employer Characteristics!

The location of employers was an important requirement of our data, as outlined above. The general occupational structure within each company was also needed, so that workers' occupations could be appropriately classified and provide a sound base for further work. Number of employees by occupational category and sex was therefore required.!

!

3.3 Data Sources!

!

3.3.1 Secondary Data!

As we have seen in section 2, there have been very few studies that based their samples on the workplace and that specifically identified the attributes of the trip to work. In particular, this approach has not previously been combined with the attempt to differentiate perceptions of existing travel modes from preferred transportation characteristics which are not mode-specific. Nor do these other studies attempt to analyze the data in terms of the work-trip opportunity set.!

!

Other local data sources, such as the city's five-year transportation survey, or the administrative records of various employers, are also incomplete in many respects for the purposes of this study. The city concentrates on present travel behaviour and does not deal with preferences and perceptions. Employers often have good descriptive information on their employees, including address, occupation, and income, and in some cases this information is stored in computers. This can be useful but employers' data do not record journey-to-work characteristics. Nor can the data from the city survey and individual employers be combined, since specific employers are not identified in the city's survey.!

!

Other studies done concerning Winnipeg's transportation system were also of limited value since they also failed to provide the necessary combination of data. However, information on travel times, bus schedules and routes, were of some assistance.!

!

3.3.2 Primary Data Collection!

Since an appropriate body of data did not exist, it was necessary to generate new data for the study. In consultation with several cooperating employers (see below) a self-administered questionnaire was prepared to obtain the data. Table 1 provides an overview of how the questionnaire was constructed to

Table 1

Correspondence of Data Requirements With Questionnaire

Data Required	Question Number	Operational Variables
Travel Characteristics		
Mode & frequency	1	One-way work-trips last week
Length of trip	7	Minutes to/from work
Convenience	5a	Convenience of parking rating
	5b	Convenience of bus stops rating
Other trip functions	2	Various categories by time of day
Cost	6	Cost estimates by mode
Perception of problems	8	Rating of 3 strongest dislikes, open-ended
Perception of advantages	3	Open-ended - reason for present mode
Travel Preferences		Importance Rating (1-5) for all Question 9
Time	9-C	
Cost	9-I	
Convenience	9-A	Door-to-door
	9-B	Direct
	9-D	Freedom to make stops
	9-E	Choice of time of day
	9-H	Have travel arranged by someone else
	9-J	Readily available
	9-M	Freedom from parking problems
	9-N	Off-hour transportation
Amenities	9-L	Space to carry packages
Accessibility	9-O	Accommodate disability
Stress	9-F	Freedom from driving
	9-K	Freedom from vehicle maintenance
Sociability	9-G	Prefer travelling with others
	9-P	Prefer travelling alone

Table 1 (Cont'd.)

Data Required	Question Number	Operational Variables
Relative Rank	10	3 most desired characteristics
Personal Characteristics		
Sex	11	
Family Composition	16	Age Groups:(<12, 12-17, >17)
Income	19	8 ranges, multiples of $8,000
	17	Number of full-time earners in house
Age	12	Age Groups: 15-18, 19-24, 25-44, 45-64, 65+
Auto Ownership	18	Number owned by family
Residence	15	Postal Code
Occupation	13	Broad employer-specific categories
Working Hours	14	Start, end
Education		(not included)

satisfy the data requirements. Due to employer insistance that a question concerning educational levels would be sensitive for many employees, this was not asked. (The complete questionnaire is appended to this report.) Different employee categories were used for each employer, based on their internal classification systems. For the purposes of analysis, these were equated to standard job classifications from the Canadian Occupational Index, and assigned Blishen-McRoberts socio-economic index numbers.!

!

The employees' transportation opportunity sets were constructed from postal code data by identifying the corresponding city traffic zone, and using figures from the 1976 simulation study done by Winnipeg's Streets and Transportation Department. This data provides estimated travel times by bus and by automobile from each of 147 traffic zones to each other zone in the city. While there is some variability in travel times within zones, these figures provide a good assessment of the relative differences in travel times between bus and auto, from zone to zone.!

!

3.3.3 Methodology!

The methodology may be useful in other cities or areas of cities where capital intensive transportation systems are impractical. Questionnaires were supplied to the entire workforce of several cooperating employers. Employees' residences were located in relation to their workplace and existing transportation options, and their characteristics, attitudes and preferences in relation to the work-trip were identified. This approach has the advantage of being able to identify the potential for carpooling or other alternative arrangements in relation to specific employers. The large company, industrial park, or cluster of employers can then become the unit for analysis and development of alternatives, as opposed to the city as a whole, or the neighbourhood. Unlike the neighbourhood which involves a wide variety of transportation needs and destinations, the workplace provides a relatively uniform destination in space and time and therefore offers greater possibilities for identifying common transportation needs. Analysis on this scale has the added advantage of providing information which may be of interest to individual employers in developing independent transportation options, or in assessing their recruitment policies.!

!

The questionnaire was developed in consultation with the cooperating employers and arrangements were made for distribution according to the organization and routines of each employer. Meetings were held with supervisory staff at the three smaller companies to discuss the purpose of the survey and to clarify the questionnaire itself. At the larger company, the internal newsletter was used to publicize this information. This employer, unlike the other three, allowed employees time off to fill in the answers, and also made efforts to insure anonymity, a concern that did not come up at the smaller companies.!

!

All the survey questionnaires were distributed and returned between the middle of November and the middle of December with timing varying slightly among the companies.!

!

3.3.4 The Sample!

Five Winnipeg employers at two locations initially agreed to participate in the survey. However, one of these (Canada West Shoe) withdrew from the project because of time constraints. We were left with the following four employers:!

Inkster Industrial Park!	
Winnipeg Photo	330 employees!
Northern Telecom	340 employees!
AEL Microtel	170 employees!
Downtown!	
Great West Life!	
Osborne Street	1130 employees!
Rupertsland	700 employees!

The Inkster Park location in the north Winnipeg suburban area, is characterized by limited street access and bus services. These companies hire workers with a wide variety of social and educational backgrounds. Winnipeg Photo is a photographic processing company with a large number of production workers with various specialties. High school graduation is not required for these positions, and training is done on the job. There are a smaller number of supervisory, managerial, and office staff. The two other Inkster Park companies are electronic equipment manufacturing firms, involving workers doing assembly-line work, as well as more skilled technicians and highly skilled machinists. Educational levels required range from grade 9 for unskilled workers, to technical post-secondary or on-the-job skill training. Clerical and managerial staff are also employed. Parking space at the Inkster Park companies is quite adequate, and it has been estimated that 80 percent of all Inkster Park workers travel to work by automobile. 18 percent of this group travel as auto passengers, and 82 percent are auto drivers.!

!

Great West Life is a major downtown employer located on or near a high number of radial bus routes. Its employees run the gamut of white collar work, from clerical workers to executives and managers. A number of maintenance technicians with various specialties are also employed at these two nearby locations. The company has dedicated a significant portion of its property holdings to surface level automobile parking. The number of parking spaces will diminish considerably over the next decade because of currently announced expansion plans. Simultaneously, new populations requiring urban transport will be introduced to the location.!

!

While these four companies do provide a variety of workers, their level of employment (as measured by the Blishen-McRoberts scale) is somewhat higher on average than that of the general workforce.!

!

The questionnaire was filled in by approximately 1,500 individuals out of a total of 2,600 workers, for a response rate of 57 percent. The table below shows the different rates for each company:!

Company	Response Rate!
AEL Microtel	63%
Northern Telecom	29%
Winnipeg Photo	37%
Great West Life	63%!

!

Respondents of both sexes returned questionnaires generally in proportion to their total numbers. However there were marked differences in the responses from different employee categories. Thus sub-group response rates went from 20 percent up to 100 percent, but did not seem to follow any consistent pattern from company to company.!

4.0 ANALYSIS OF SURVEY RESULTS!

!

4.1 Introduction

This chapter summarizes the overall survey results and presents the statistical analysis of the results. The statistical analysis is interpreted for policy implications in the later portions of the chapter.!

!

Section 4.2 presents comparative summaries of the behaviour of respondents with respect to mode choice and side-trip frequency during work-trip. The major differences between behaviour at Inkster Park and Great West Life are obvious in the results. The behavioural elements are discussed with reference to key explanatory variables of income, job category, sex and age.!

!

Section 4.3 illustrates the comparison in preference structures at Inkster Park and Great West Life. Again the data are discussed with reference to income, job category, and sex variables.!

!

Section 4.4 presents an analysis of the trip behaviour in terms of mode choice relative to the opportunity set available to the respondent. This section again demonstrates the differences between the situation at Inkster Park and that at Great West Life.!

!

Section 4.5 provides analysis of the preference structures at the two locations using the tools of regression analysis to explore statistically significant patterns. The regression analysis in concert with the previous analysis provides the basis for policy interpretation.!

!

Section 4.6 outlines conclusions from the analysis and presents policy interpretations. Again the differing situations at Inkster Park (I.P.) and Great West Life (G.W.L.) require different policy responses.!

!

It also presents an initial identification of potential target populations for alternate modes of the trip to work. The analysis identifies geographic concentrations of single occupant drivers who have a high preference for particular modal characteristics. Using these characteristics, alternative modal types could be identified.!

!

4.2 Trip Frequency by Mode: A Comparison of Inkster Park and Great West Life!

In terms of major findings from the examination of frequency of work-trips by mode (Table 2), looking first at Inkster Park, it is noteworthy that only 36 percent of those surveyed indicated that they hadn't made any trips as a single occupant driver during the previous week while 89 percent indicated they had made no trips on the bus. Clearly, the private auto is the predominant means of making the work-trip for the Inkster workers. In the case of Great West Life workers, 61 percent of respondents indicated they hadn't made trips as single occupant drivers while significant numbers also indicated that they had not made trips in the other two private auto modes. In particular contrast to the Inkster workers, were the number of respondents who reported use of the bus mode - 25 percent made fewer than ten trips by bus while an approximately equal number made ten or more bus trips. The use of taxis was almost negligible at both locales and the use of the walk mode was only slightly more common at both sites.!

!

4.2.1 Major Mode by Income!

Contingency tests were run for both Inkster Park and Great West Life to test whether major mode of transportation and income level were independent of each

Table 2

Trip Frequency by Mode, Inkster Park and Great West Life *

(No. of Respondents)

Trip Frequency and Location	Mode					
	Private Auto/ Driver Only	Private Auto/ Driver With Passenger	Private Auto/ Passenger	Taxi	Bus	Walked
Zero trips/week						
I.P.	122	269	278	334	301	316
G.W.L.	712	967	856	1144	582	1050
Less than 10 trips/week						
I.P.	52	34	24	2	14	12
G.W.L.	198	110	236	14	289	50
10 trips/week or more						
I.P.	164	34	34	1	22	9
G.W.L.	249	82	67	1	288	59
Total # of respondents						
I.P.	338	337	336	337	337	337
G.W.L.	1159	1159	1159	1159	1159	1159

* See Appendix C for a graphical presentation of relative trip frequencies.

other. The resulting chi-square score for Great West Life established a strong dependent relationship for the two factors. However, a similar test for Inkster Park did not indicate a statistically significant dependency relationship between major mode and income.!

!

In order to better illustrate the relationship between mode and socio-economic factors at the two work locations, pairs of charts were constructed on which were plotted:!

(1) the probability of the single occupant driver mode (largest auto mode group) by the particular socio-economic variable under analysis for each site; and

(2) the probability of the bus mode by socio-economic variable for each site.

Charts 1A and 1B illustrate the locational differences for mode on the basis of income. Chart 1A, which deals with the single occupant driver mode, gives a clear illustration of the much greater propensity for use of this mode at Inkster Park at all income levels. In terms of the effect of income, while its impact on mode at Great West is shown to be a strong one, the relationship between the two factors for Inkster workers appears rather weak beyond the first income category. Chart 1B, which examines the bus mode, illustrates the much greater use of buses by the Great West workers at all income levels and the much stronger negative relationship at Great West Life between probability of bus use and higher income.!

!

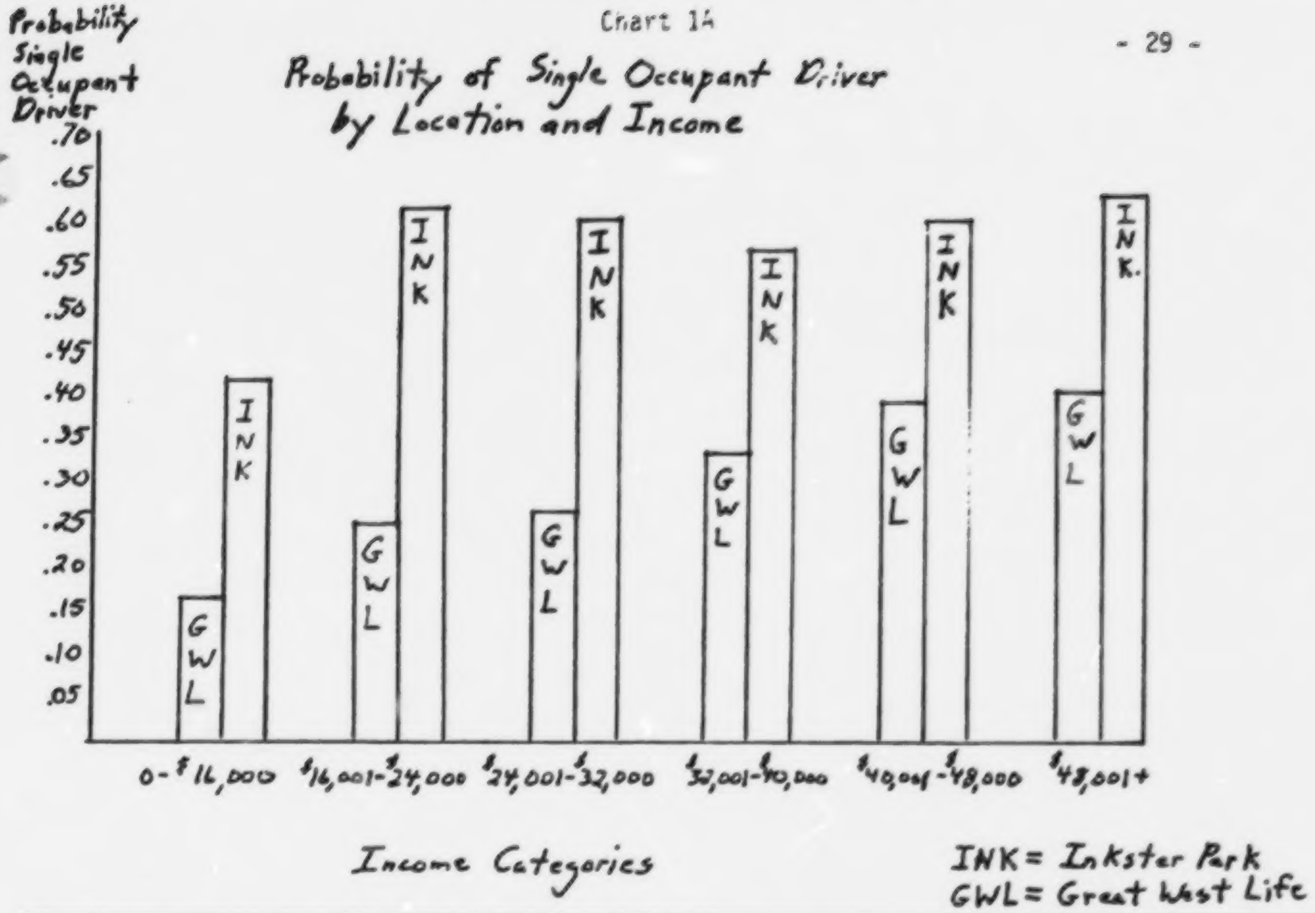
4.2.2 Major Mode by Job Class

Contingency tests indicated dependency between these factors for both work sites. Chart 2A (single occupant driver) illustrates a very strong job class effect on propensity to use the single driver mode at Great West.* The relationship is

---

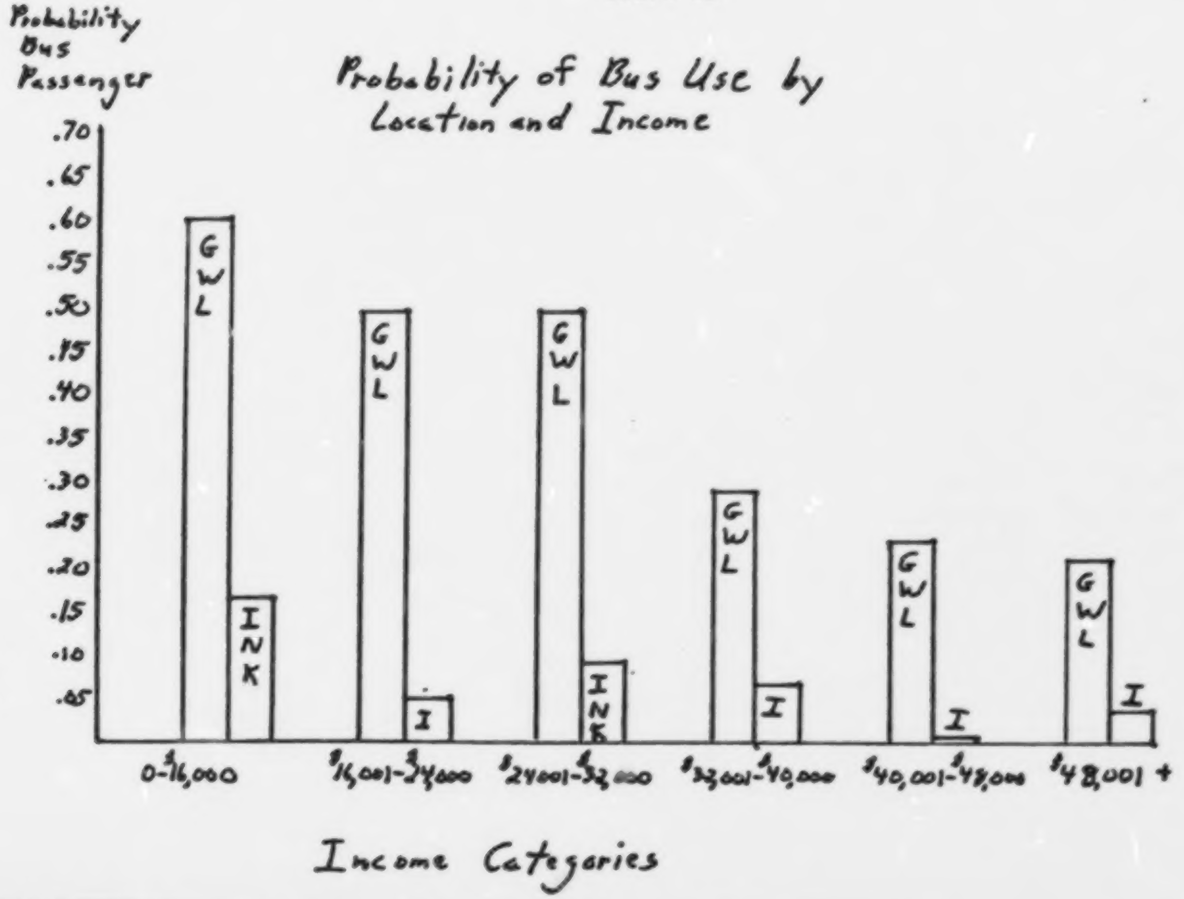
* It should be noted that Job Class Category 2 was not used in the Great West Life survey because it was not relevant to the population there.!

Chart 1A



Probability of Single Occupant Driver by Location and Income

Chart 1B



Probability of Bus Use by Location and Income

Chart 2A

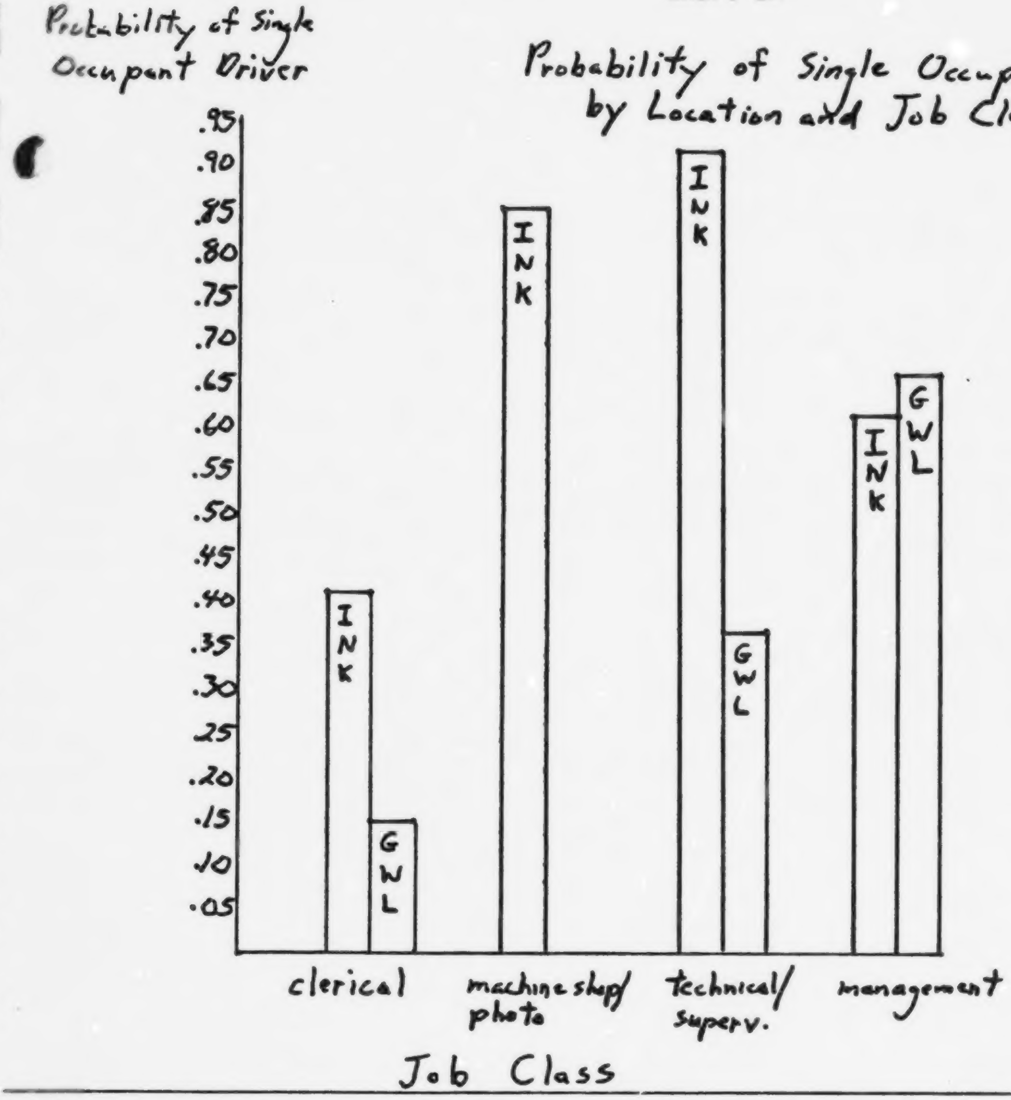
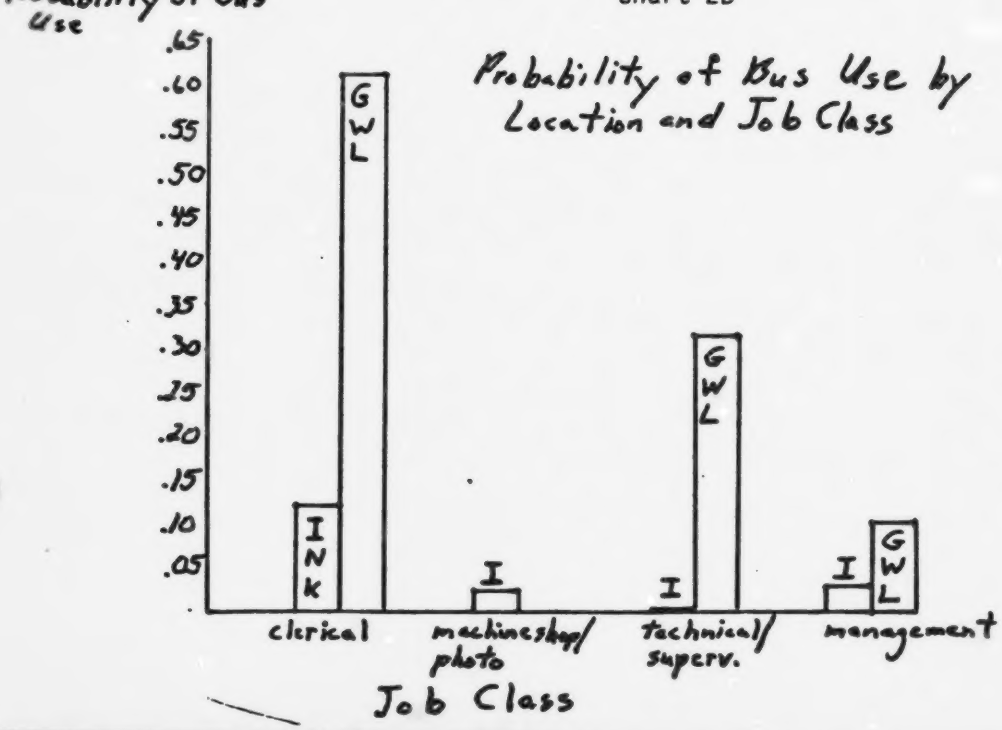

Probability of Single Occupant Driver by Location and Job Class

Chart 2B


Probability of Bus Use by Location and Job Class

less clear for Inkster Park workers. The chart also shows that, except for the management category there is a greater probability of the single occupant mode for all job classes at Inkster in comparison to Great West. Chart 2B (bus users) illustrates a job class effect at both sites, but one which is much stronger at Great West Life. The graph also demonstrates the higher propensity in all job classes for Great West workers to use the bus as compared to Inkster workers.!

!

4.2.3 Major Mode by Age!

The chi-square value from the contingency test for Great West Life suggests a strong relationship of dependency between these two factors. However, the test for Inkster Park indicates a relationship between mode and age which is not statistically significant. The graphs constructed to illustrate this relationship produce some interesting findings. Chart 3A, (single occupant drivers) indicates a positive relationship at both work sites, although the relationship at Inkster Park appears quite weak while that at Great West appears very strong. This also shows the much higher propensity to use the single occupant driver mode by all age groups at Inkster Park in comparison to Great West Life.!

!

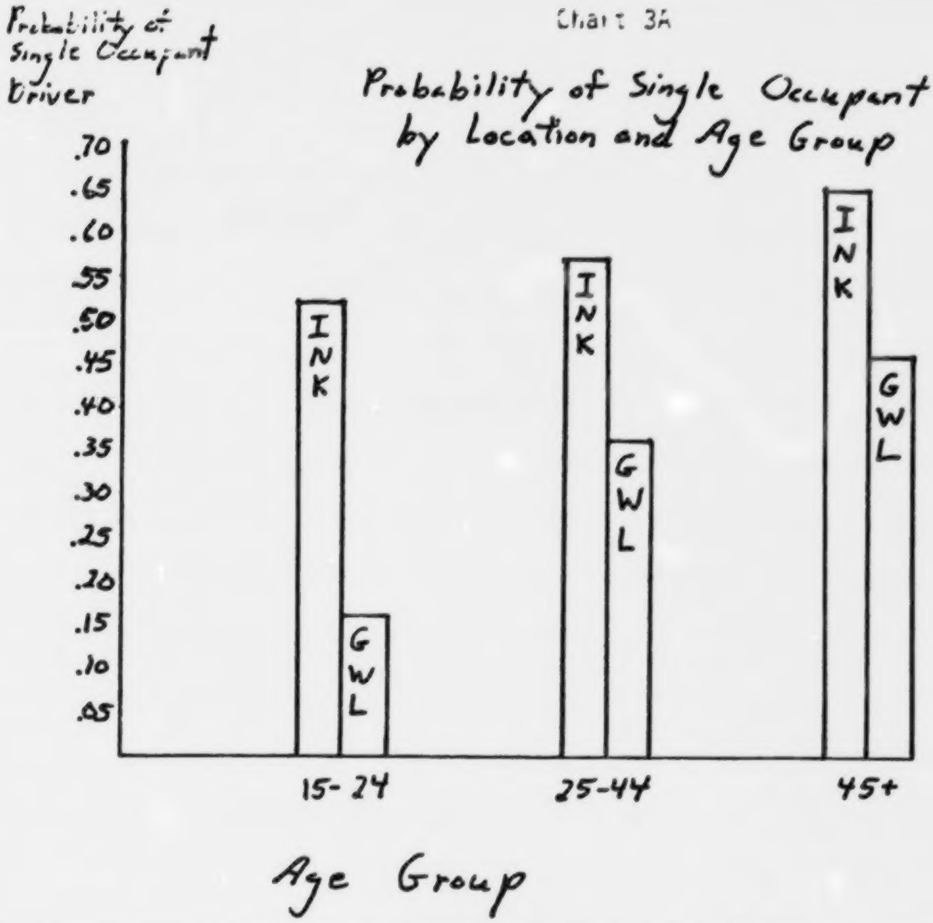
Chart 3B (bus users) suggests no effect of age group on bus use for Inkster workers while indicating a fairly strong age effect for the workers at Great West. The graph also shows the greater probability of bus use for all age groups at Great West as compared to Inkster.!

!

4.2.4 Major Mode by Sex!

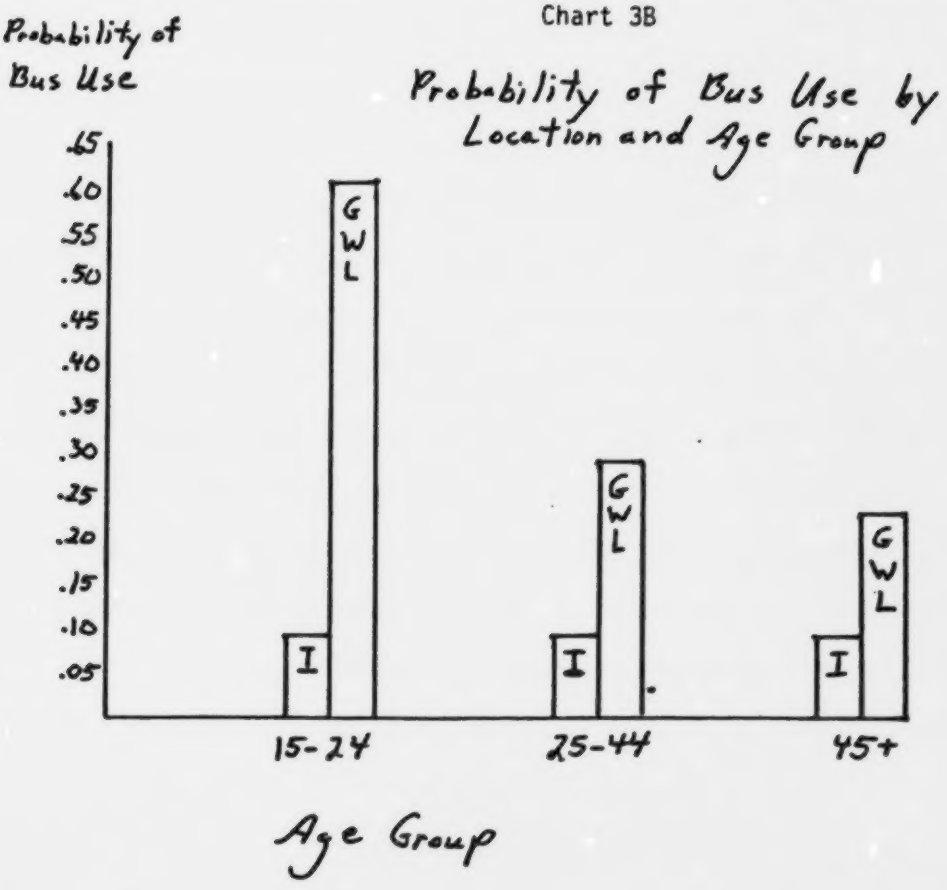
The contingency tests for sex and mode indicate a dependent relationship for both work sites. Bar graphs (4A and 4B) have been used to illustrate the probability of selecting a mode by sex. Chart 4A (single occupant drivers) shows clearly the higher propensity of this mode for Inkster workers regardless of sex. It also

Chart 3A

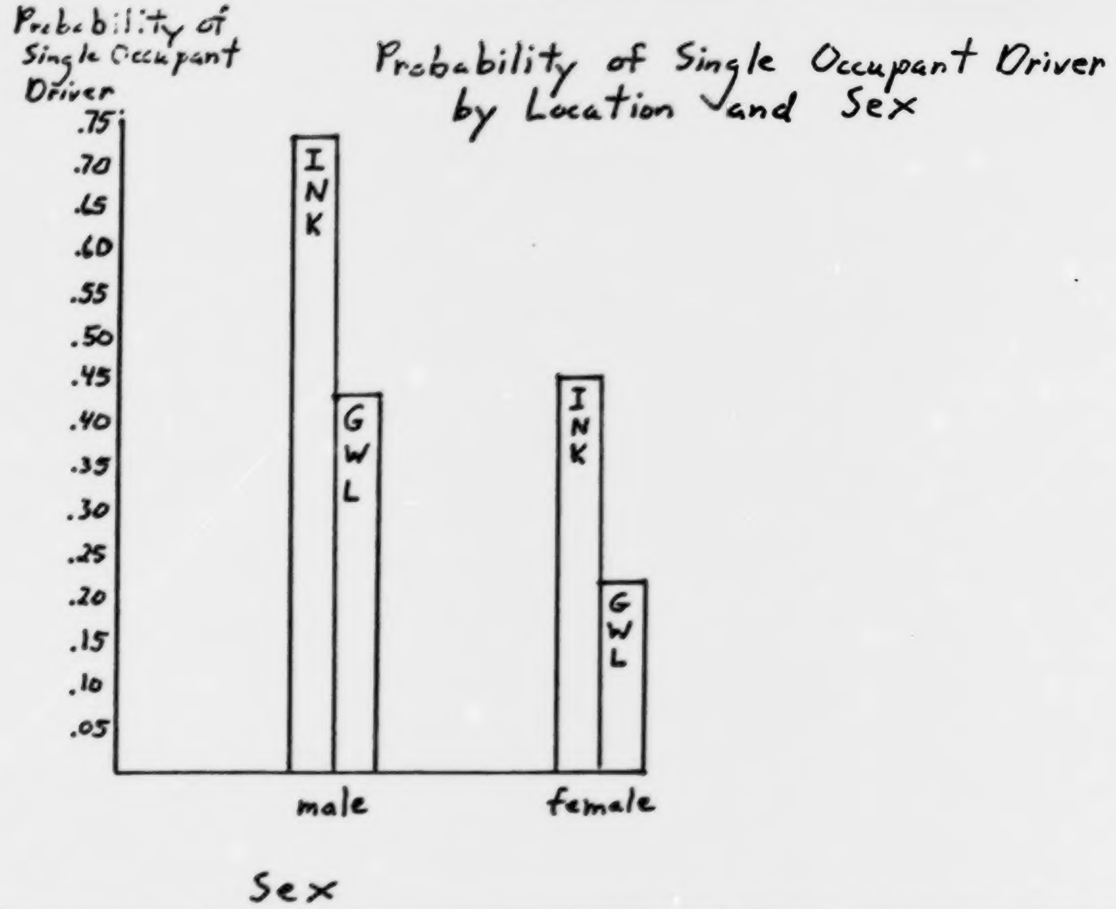


Probability of Single Occupant Driver by Location and Age Group

Chart 3B

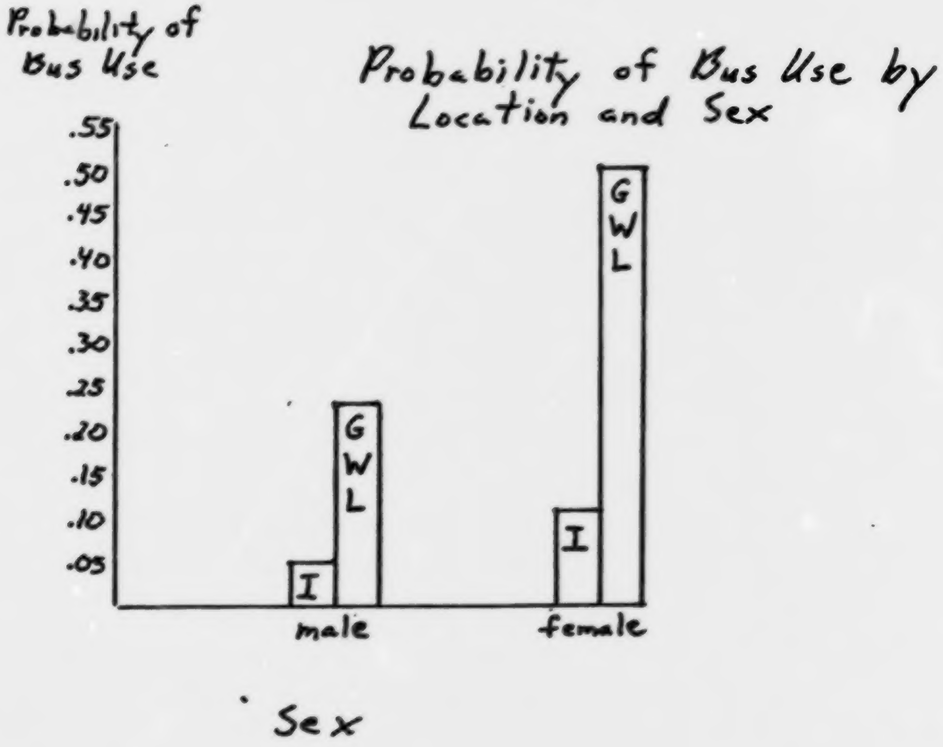


Probability of Bus Use by Location and Age Group



Probability of Single Occupant Driver by Location and Sex

Chart 4B



Probability of Bus Use by Location and Sex illustrates that one's sex strongly effects use of this mode at both locales with males being much more likely to use the single driver mode at both Inkster Park and Great West Life.!

!

Chart 4B (bus users) demonstrates the greater propensity to use buses at Great West Life in comparison to Inkster Park. The graph further indicates that for Great West workers, the sexes are greatly differentiated in terms of bus use with the probability being much greater for women. The differential for the sexes is much smaller at Inkster, although again the likelihood of bus use is greater for the female group.!

!

4.2.5 Side Trips: A Comparison of the Two Locations!

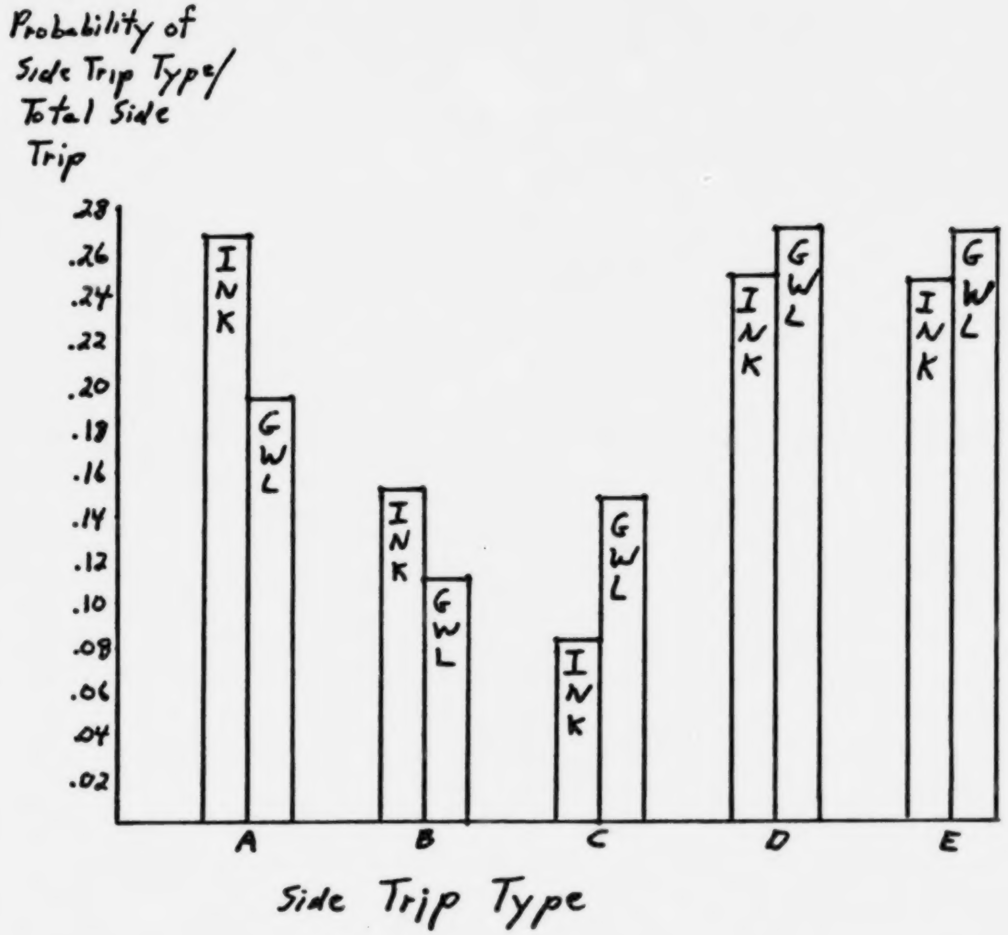
An examination of the data on side trips of all types during the journey to work at both Inkster Park and Great West Life reveals a high probability of such trips. Virtually one journey out of two involves a side trip. The proportion at Great West Life is .495 while at Inkster Park it is .463.!

!

In order to compare the propensity to make particular types of side trips between the two employment locations, proportions for each side trip type to total side trips were generated for Inkster Park and Great West Life. Chart 5 graphically illustrates the findings from this exercise. It is apparent that a general comparability exists between the two locales in terms of the propensity to make particular side trips. Nevertheless, some notable differences do emerge. Workers at Inkster Park are more likely than their counterparts at Great West Life to make side trips to pick up or drop off adult passengers and to some extent to pick up or drop off children. On the other hand, Great West Life employees exhibit a greater propensity to make side trips to pick up or drop off packages, a situation

Chart 5

Probability of Side Trip by Type and Location



Key

A Pick up or drop off adult passengers
B Pick up or drop off child
C Pick up or drop off package
D Go to another destination
E Attend to other personal business

which may reflect the effect of the proximity of Great West Life offices to major shopping districts.!

!

The question of side trip behaviour versus socio-economic variables warrants an analysis on the basis of mode choice as well. Unfortunately the frequency of small cells (unique answers) precluded such an analysis.!

!

4.2.5.1 Side Trips by Income Group!

A contingency test established that there is a dependency relationship between these two factors for the Inkster Park group. In terms of total side trips by particular income groups, no clear pattern emerged. However, it is worth noting that a much higher proportion (.78) of all side trips to total work trips was taken by those in income group 5 ($40,001-$48,000) than by any other income group. Chart 6A illustrates the differences in proprotions of side trips to total work trips by income groups for each type of side trip. Again, no clear pattern emerges. Nevertheless, the graph does suggest that the type C side trip is significantly less common than the other types for all income groups. It also illustrates the generally greater preponderance of those in income category 5 to take all types of side trips.!

!

A contingency test also indicated a dependency relationship between type of side trip and income group for the workers at Great West Life. Similarly to the Inkster Park group, no clear pattern emerged in regard to proportions of total side trips by income groups, although again income group 5 exhibited the highest proportion (.66). No distinct pattern on the basis of income group is exhibited for the five types of side trips among the Great West Life workers (Chart 6B). Perhaps what the graph best illustrates is, once again, the generally greater propensity

Chart 6A

Probability of Side Trip/Total Work Trip by Incom[illegible]roup and Side Trip Type - Inkster Park

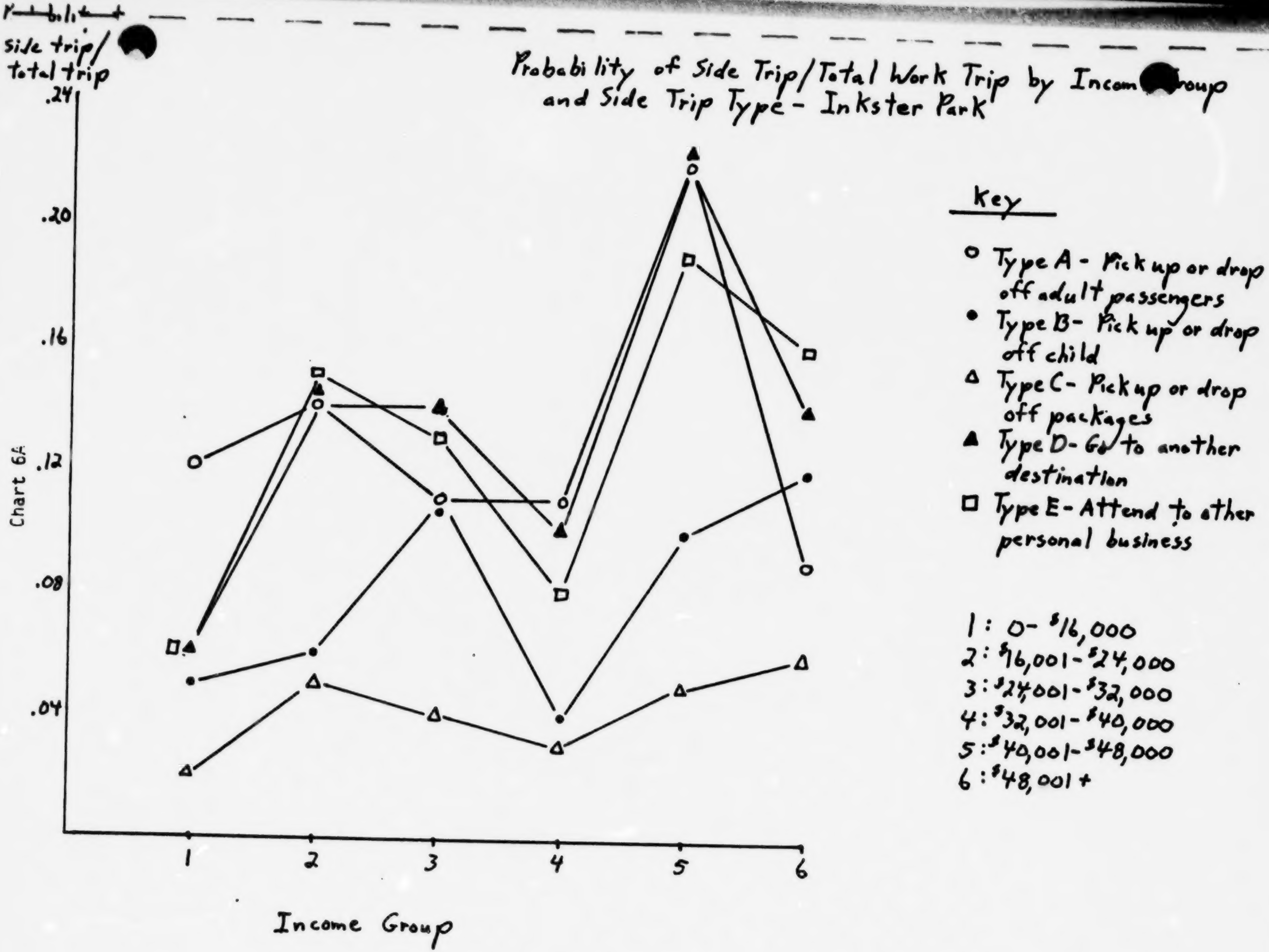
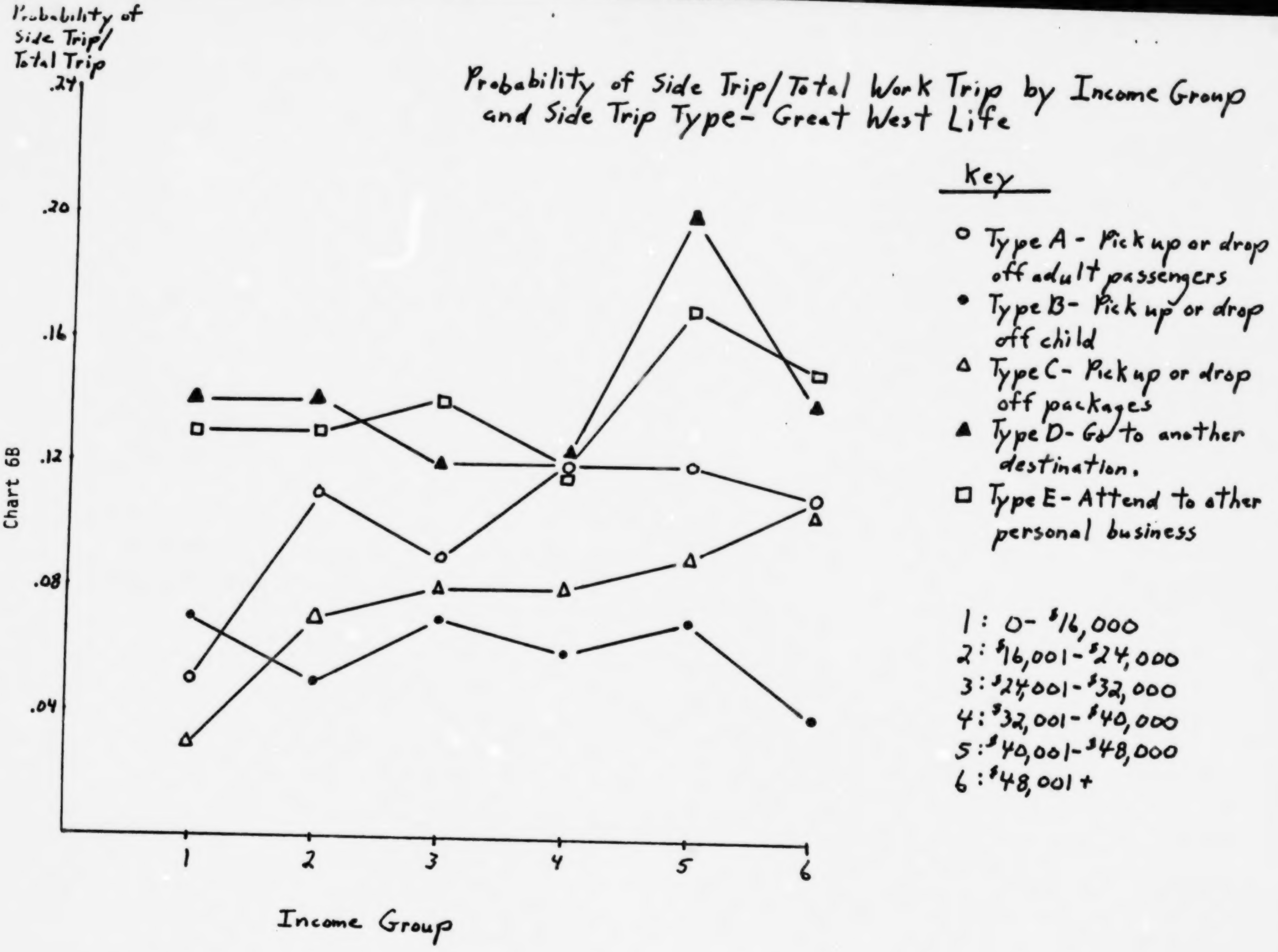


Chart 6B



Probability of Side Trip/Total Work Trip by Income Group and Side Trip Type- Great West Life for income group 5 workers to take side trips of all types than those in the other groups. However, it should also be noted that the graph indicates side trips to pick up or drop off children to be generally the least common side trip type across income groups, except for income group 1 ($16,000 or less).!

!

Looking at the two work sites together, the most obvious observation which can be made is that income does affect the probability of taking side trips in both places but this effect differs quite notably for each type of side trip. The differences between the two locations appear to be quite small for the side trip by income group relationship.!

!

4.2.5.2 Side Trips by Job Class!

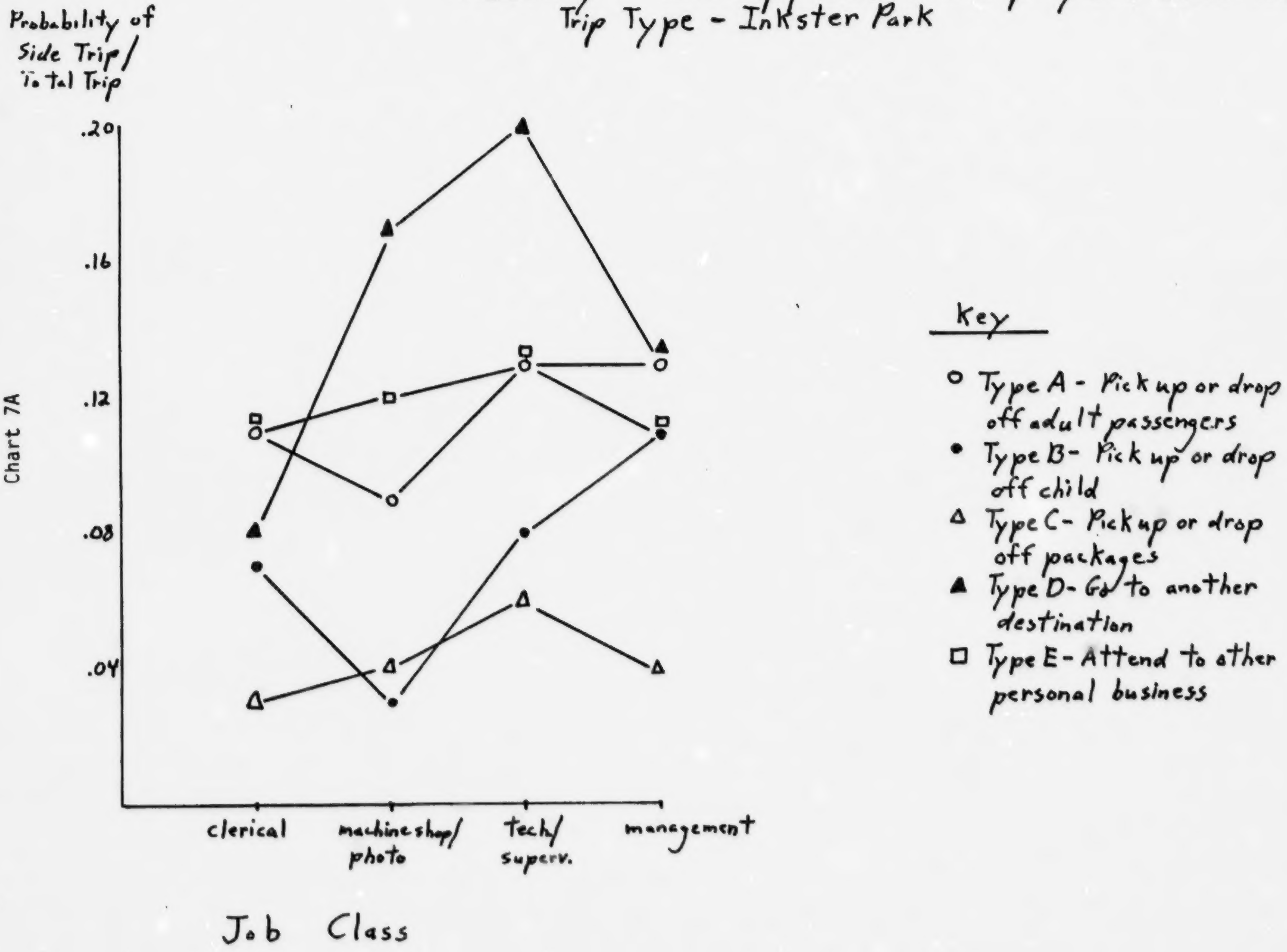
A contingency test indicated a relationship of dependency between these two factors for the workers at Inkster Park. Looking first at total side trips by particular job classes, an interesting pattern does seem apparent. The proportion of total side trips (regardless of type) to work trips increased by job class until job class 3 then fell somewhat at job class 4. Chart 7A provides illustration of the differentiation among side trip types on the basis of job class for Inkster Park. As would be expected, for most of the side trip types the probability of the side trip rises from job class 1 to job class 3 then falls off. Perhaps more interesting is the clear illustration of the high propensity for Inkster Park workers in the three highest job classes to make type D (other destination) side trips.!

!

Turning to Great West Life, a contingency test indicated a dependency relationship for side trips and job class at this site as well. The proportions of total side trips to total work trips by the three job classes at Great West

Chart 7A

Probability of Side Trip/Total Work Trip by Job Class and Side Trip Type - Inkster Park



Life (class 2 was not relevant to Great West Life) reveal a similar pattern to that at Inkster Park -- the proportion of total side trips peaks at job class 3 then falls off at class 4. However, this pattern is not clearly reflected on the basis of the five individual side trip types (see Chart 7B). What does appear noteworthy from the graph is the decline from job classes 1 to 4 in the propensity of Great West Life workers to make Type B side trips (pick up/drop off child).!

!

To conclude, it appears job class does affect the propensity to make side trips at both places and that the overall pattern and proportions of side trips to total trips by job type at Inkster Park and Great West Life are quite similar.!

!

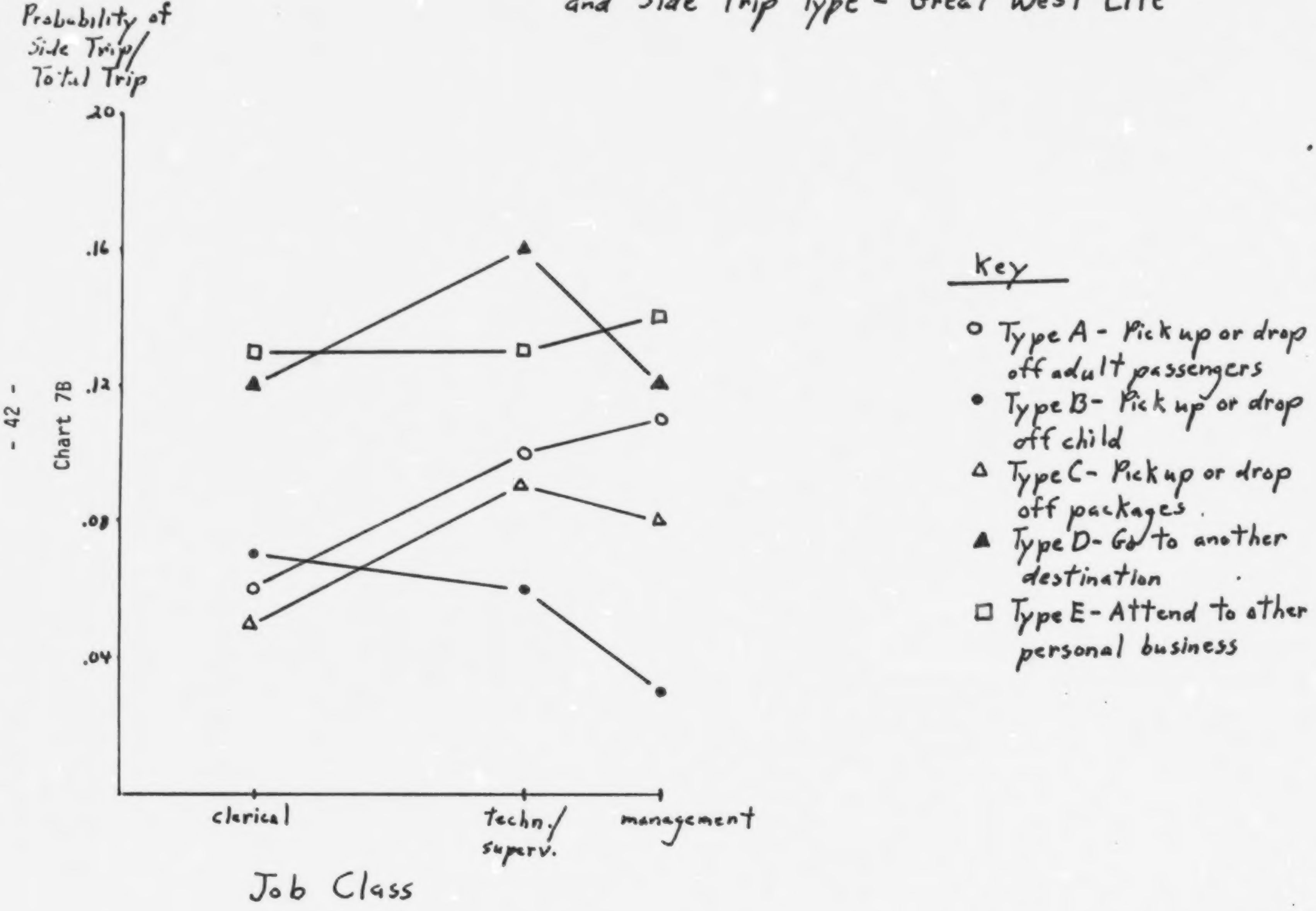
4.2.5.3 Side Trips by Age Group!

A dependency relationship between these two factors for the workers at Inkster Park is indicated by contingency testing. In examining the proportion of total side trips to total work trips it appears the propensity to take side trips is fairly constant for the youngest and middle age groups then falls markedly for the oldest age group. An examination of the proportions by individual side trip type reveals no particular pattern among all the types (Chart 8A). Nevertheless and not surprisingly, an extreme drop is illustrated in the propensity to make a side trip to pick up or drop off children for the oldest age group. Less explainable is the even more severe drop in the propensity for those in the oldest age group to pick up or drop off adult passengers.!

!

In the case of Great West Life, a contingency test also revealed a relationship of dependency between age group and side trip. The pattern which emerges for the proportion of total side trips to total work trips differs from that

Chart 7B



Probability of Side Trip/Total Work Trip by Job Class and Side Trip Type - Great West Life

Chart 8A

Probability of Side Trip/Total Work Trip by Age Group and Type of Side Trip – Inkster Park

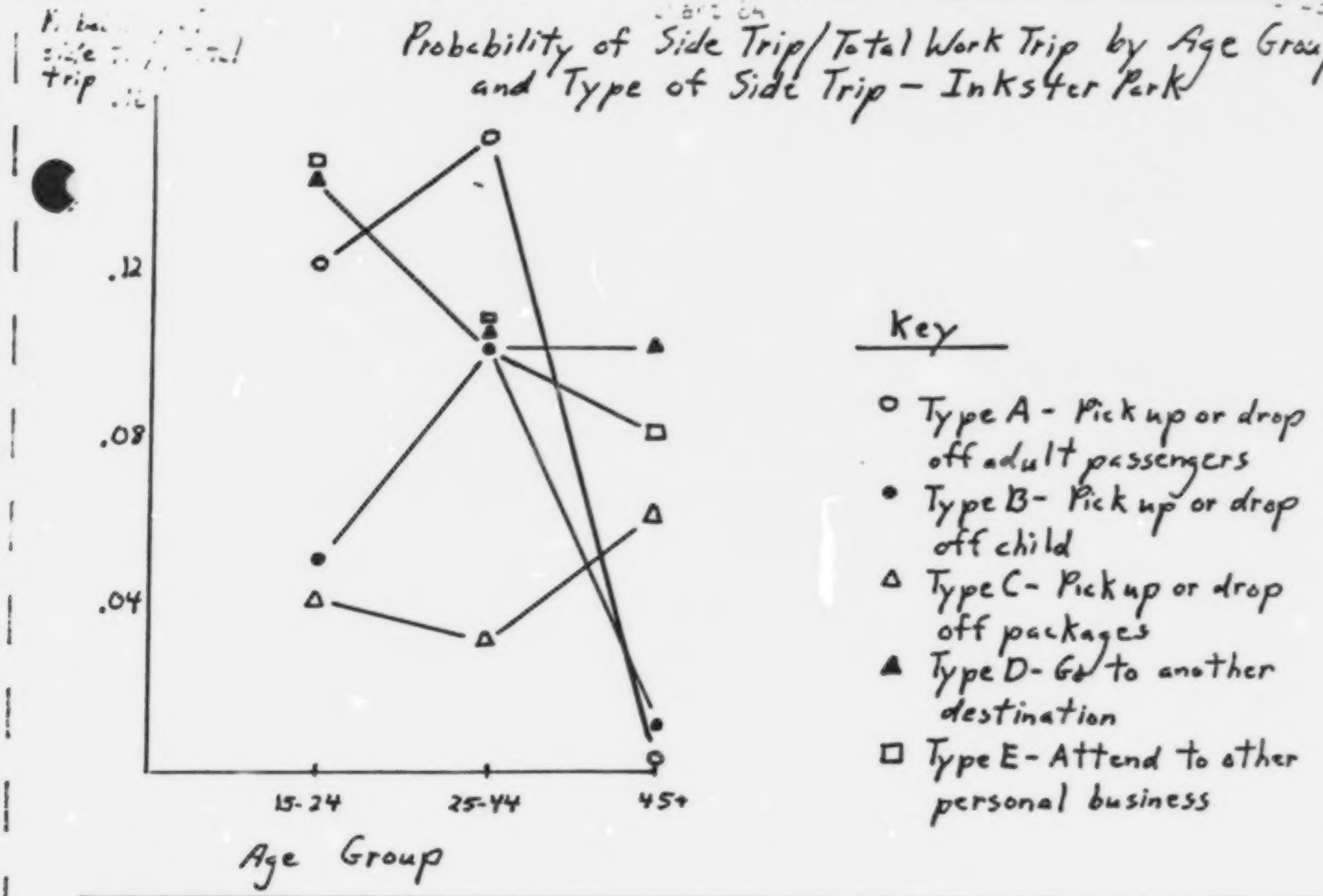
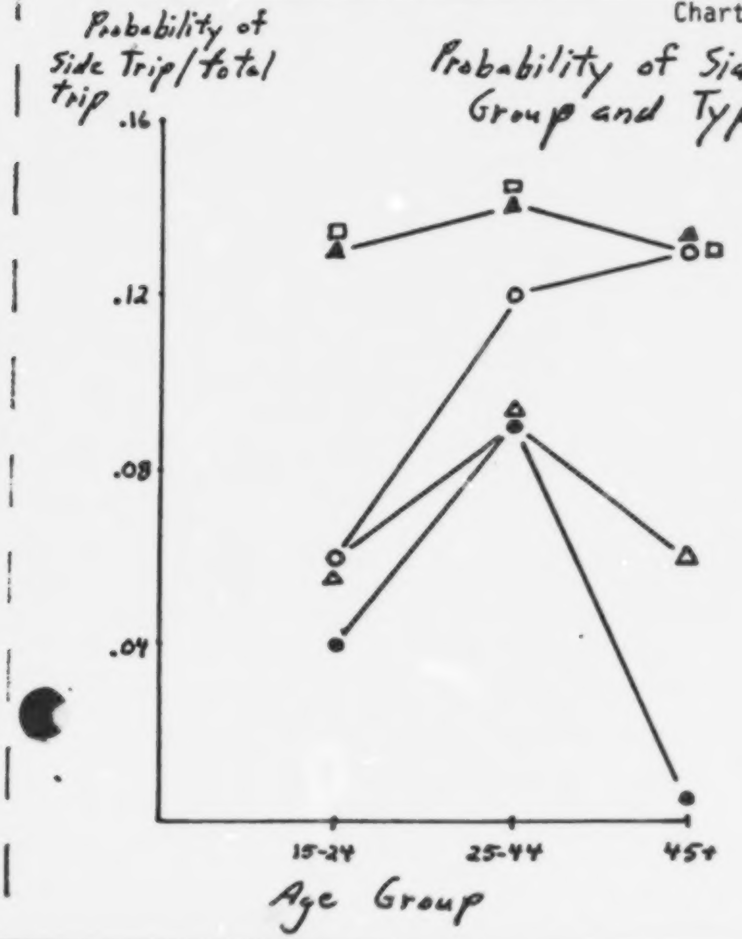


Chart 8B

Probability of Side Trip/Total Work Trip by Age Group and Type of Side Trip – Great West Life



of Inkster Park as it noticeably increases from the youngest age group to the middle age group where it peaks at .58, then diminishes for the oldest age group. In general, the pattern at Great West Life for the different types of side trips (Chart 8B) is consistent with that for total side trips - the propensity to make the various kinds of side trips increases from age group 1 to age group 2 then falls again at age group 3. The one side trip type which breaks this pattern is the trip to pick up or drop off adult passengers, the propensity for which continues to increase from the middle to the oldest age group, a notable difference from the case at Inkster Park. However, the expected much lesser propensity for those in the oldest age group to pick up or drop off children mirrors the Inkster finding.!

!

Clearly, in comparing the two work sites, the effect of age group on side trips is evident at both Great West Life and Inkster Park but is much more uniform across side trip types at Great West Life. A particularly notable additional difference is the higher propensity for the middle age group to make side trips at Great West Life than at Inkster Park!

!

4.2.5.4 Side Trips by Sex!

Once again the contingency test indicated that there is a dependency relationship between the two factors under analysis for Inkster Park. An examination of total side trips to total work trips reveals some difference between the sexes with males being slightly more likely to make side trips at the industrial park. Chart 9A reveals some interesting differences between the sexes for particular types of side trips. Females appear more likely to make side trips to pick up or drop off children while males appear to have a greater propensity to make side trips to other destinations.!

!

In the case of the Great West Life workers, a dependency relationship for side trips and sex was also clearly indicated by the contingency testing. However, unlike Inkster Park, in terms of proportion of total side trips to total work trips there is virtually no difference between the two sexes. Nevertheless, interesting differences along gender lines do appear for particular types of side trips when Chart 9B is examined. Males, for instance, are more likely than females to pick up or drop off adult passengers (the proportions for the two sexes at Inkster were identical for this side trip). Similarly to Inkster Park, females are more likely to make side trips to pick up or drop off children. However, unlike Inkster there is no difference between the sexes in the propensity to make side trips to other destinations at Great West Life.!

!

To conclude, the two work sites both exhibit interesting differences between the sexes for particular types of side trips, although, except for the side trip to pick up or drop off children, the side trips where these notable differences occur vary from Inkster Park to Great West Life.!

Probability of Side Trip/Total Work Trip by Sex and Side Trip Type - Inkster Park

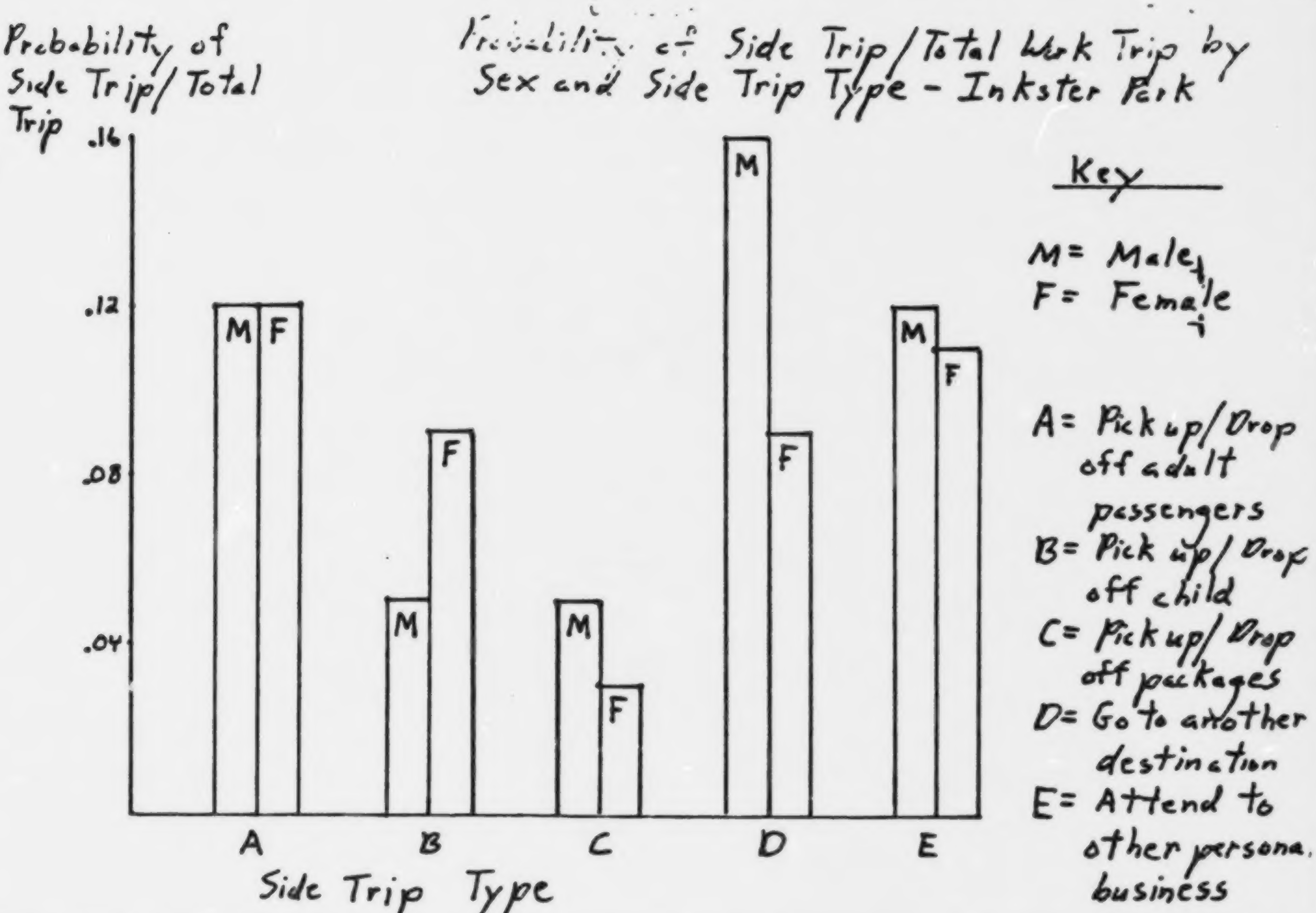
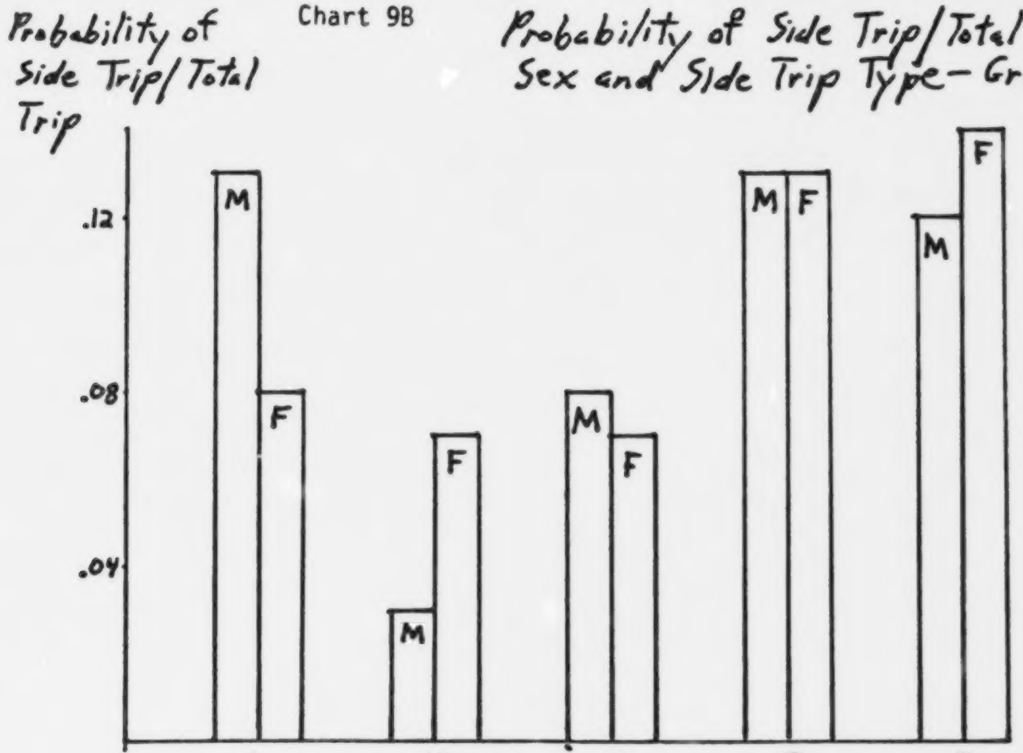


Chart 9B

Probability of Side Trip/Total Work Trip by Sex and Side Trip Type - Great West Life



Travel Mode Preferences

!

4.3.1 Reasons for Present Mode

The preference structure of respondents was initially investigated through an open-ended question concerning why employees used their present mode of transportation. The answers to this question have been grouped into eight categories presented in Table 3 below, comparing percentages of those responding, between the Inkster Park and Great West Life groups.!

!

It will be noted that there are substantial differences between the two groups. This is not surprising in view of the different mode use patterns of these groups. Most striking is the emphasis on poor bus service at Inkster Park which is apparently a motivating factor for one third of this group in deciding to drive to work. The much lesser emphasis at Inkster Park on travel costs suggests that these employees do not feel they are taking an inexpensive method of transportation. The fact that 23.3 percent rationalized their present mode in terms of short travel time, may also reflect the lack of quick or direct bus service.!

!

At Great West Life, on the other hand, a large proportion of the answers are consistent with travel by bus. Reasons of cost and inability to drive make up 35 percent of these responses. For both groups, the term "General Convenience", is a strong factor. This factor cannot be definitely associated with a particular mode, but may be taken to indicate the predisposition of employees to do what is easiest.!

!

There are also differences in responses to this question between sex groups, as Table 4 will illustrate. It can be seen that men are more likely than women to cite

Table 3

Reasons for Present Mode by Location

Reason	Great West Life	Inkster Park	Mean Difference and 95% Confidence Interval	
General Convenience	22.4%	19.1%	3.3	±5.2
Flexibility	12.0%	7.3%	4.7	±3.8
Poor Bus Service	9.7%	33.0%	-23.3	±5.7
Short Travel Time	12.8%	23.3%	-10.5	±5.3
No Car/Can't Drive	17.5%	9.4%	8.1	±4.1
Cost	17.5%	3.1%	14.4	±2.2
Share Ride	6.2%	1.4%	4.8	±2.0
Other	2.0%	3.5%	-1.5	±2.3
!				
Number of Responses	980	288		

Table 4

Reasons for Present Mode by Sex

Reason	Male	Female	Mean Difference and 95% Confidence Interval	
General Convenience	26.2%	20.3%	5.9	±7.3
Flexibility	17.1%	7.6%	9.5	±3.8
Poor Bus Service	14.3%	14.5%	- .2	
Short Travel Time	18.8%	13.1%	5.7	±3.9
No Car/Can't Drive	3.2%	21.4%	-18.2	±3.0
Cost	15.2%	14.4%	.8	
Share Ride	3.2%	6.1%	- 2.9	±2.2
Other	2.1%	2.5%	- .4	
Number of Responses	474	976		

flexibility and short travel time as their reasons for using their present mode, while women are much more likely not to drive at all, or not to own a car. Again, general convenience is often mentioned by both groups.!

!

In view of the fact that low income groups are more likely to cite lack of a car as a reason for present travel mode, and less likely to cite flexibility (see discussion below), the different responses for men and women is probably related to the women's lower job classifications and incomes.!

!

The structure of reasons for mode choice may also be examined by investigating differences in responses among income groups. Respondents were asked to indicate into which of eight income ranges their household incomes fell. (See questionnaire.) For the purposes of analysis the two highest and lowest income groups were merged, resulting in six income categories. Table 5 gives the results of this cross tabulation. The chi-squared test indicates that there is a strong relationship between income group and reasons for present mode, particularly for the four response categories: Flexibility, Poor Bus Service, No Car/Can't Drive, and Cost.!

!

The deviation of observed from expected frequencies is also highlighted in Charts 10A, B, C, and D.!

!

The lowest income groups are less sensitive to flexibility requirements and to poor bus service. They do exhibit greater than expected frequencies for "No Car/ Can't Drive", but about the expected level of sensitivity to cost. These groups are

Table 5

Reasons for Using Present Mode

By Income Groups

Reasons	(Low) 1 + 2	3	Income Groups 4	5	6	(High) 7 + 8	Total
General Convenience	58	56	52	42	23	43	274
Flexibility	10	24	28	34	20	23	139
Poor Bus Service	29	35	51	37	20	18	190
Short Travel Time	36	41	29	32	21	33	192
Share Ride	7	14	11	12	10	11	65
No Car/Can't Drive	90	26	39	22	7	14	198
Cost	39	41	50	28	9	13	180
Other	8	4	2	8	3	5	30
Total	277	241	262	215	113	160	1268

$\chi^2 = 143.4$

$\chi^2_{35,\ .05} = 49.7$

Chart 10A

Reason For Present Mode - Flexibility

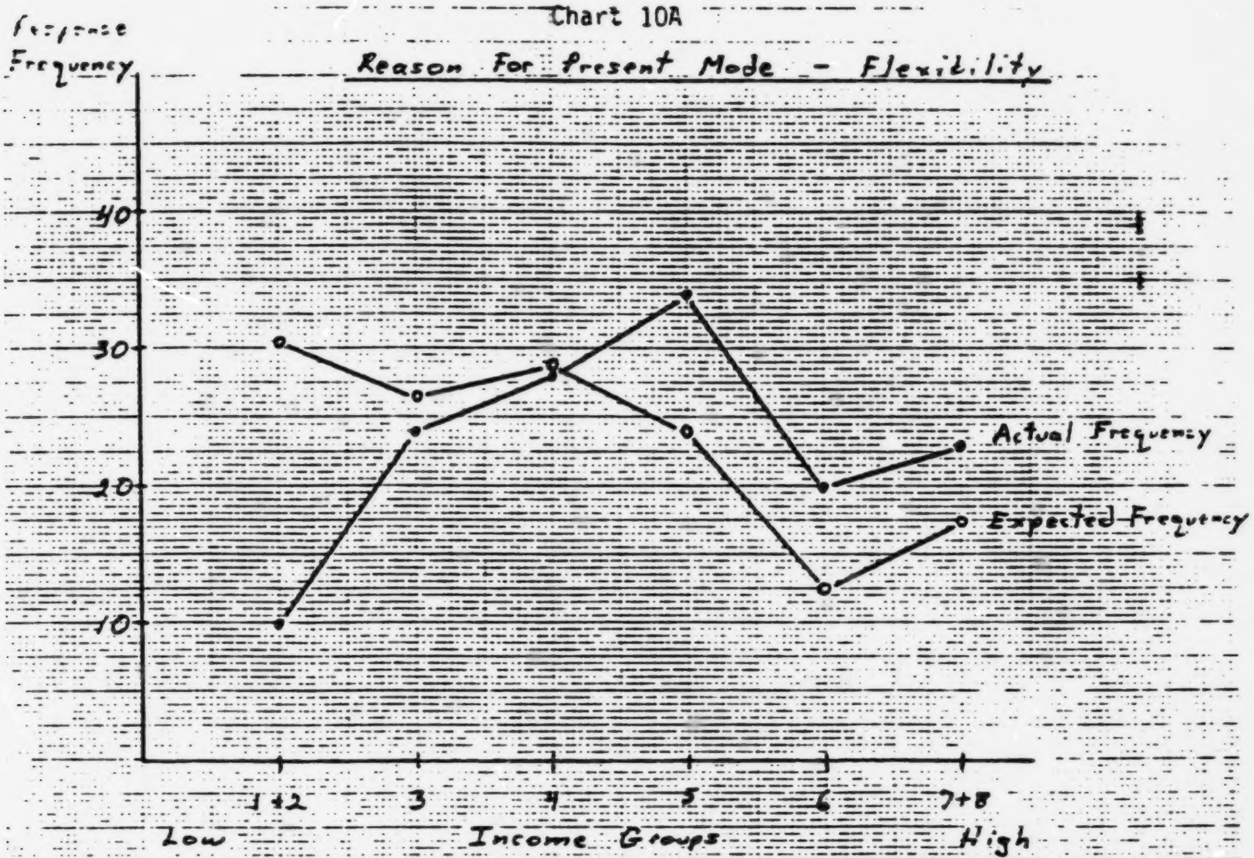


Chart 10B

Reason For Present Mode - Poor Bus Service

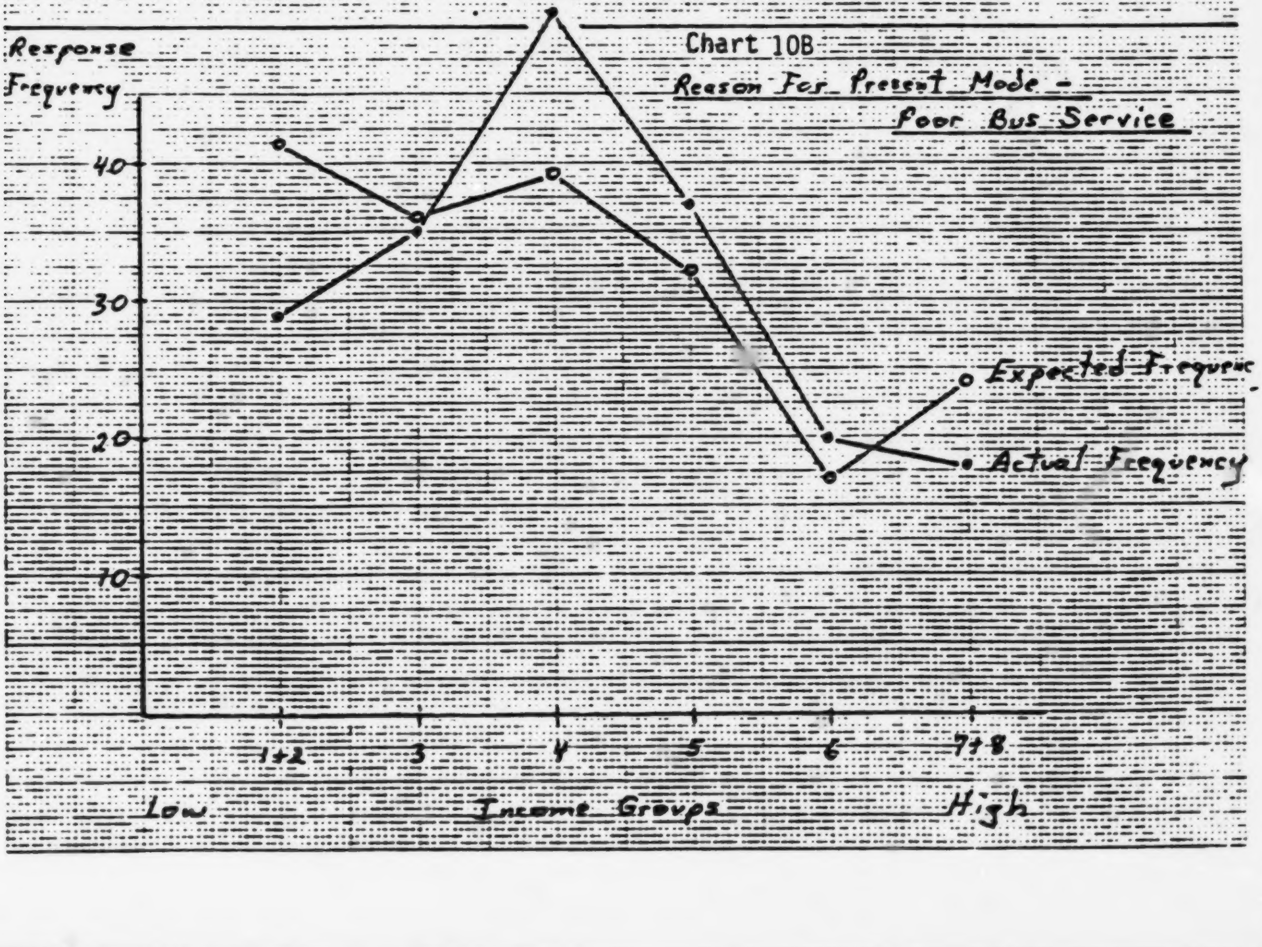


Chart 10C

Reason For Present Mode - No Car / Can't Drive

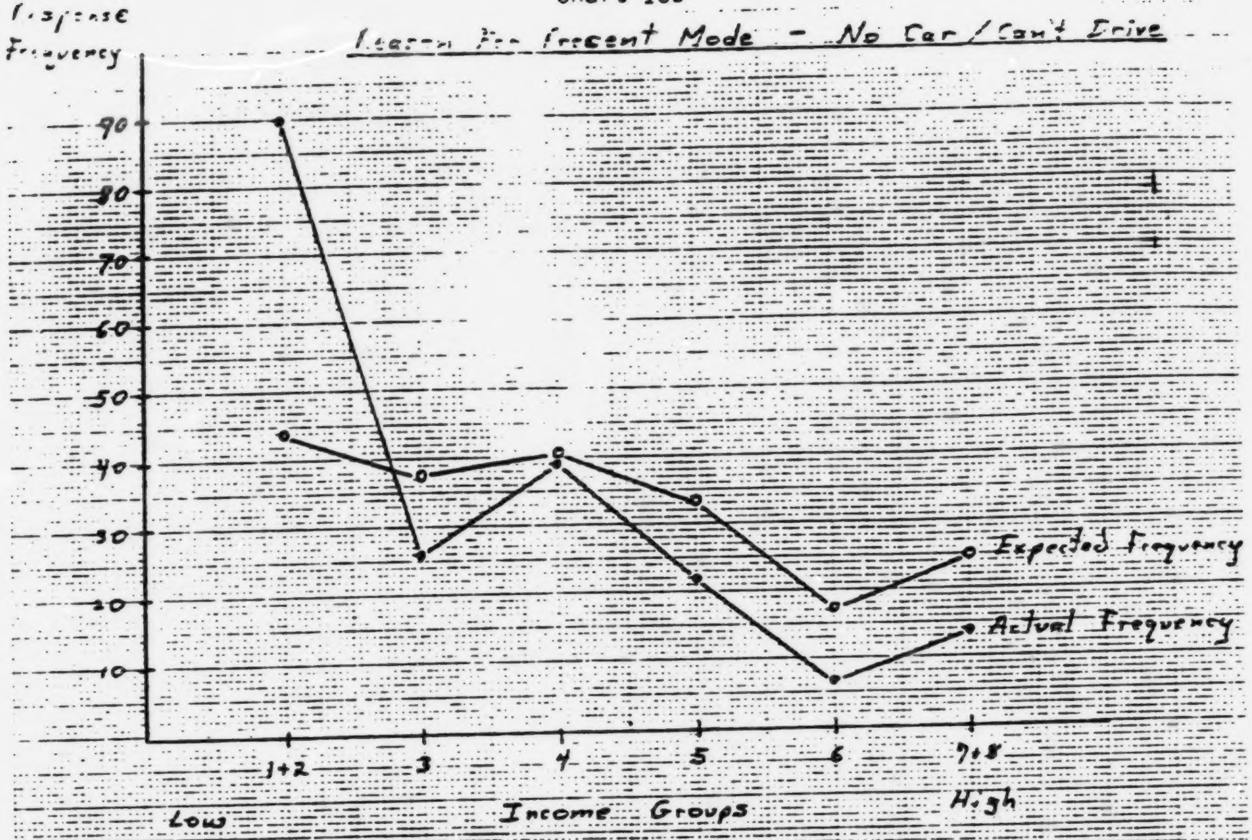
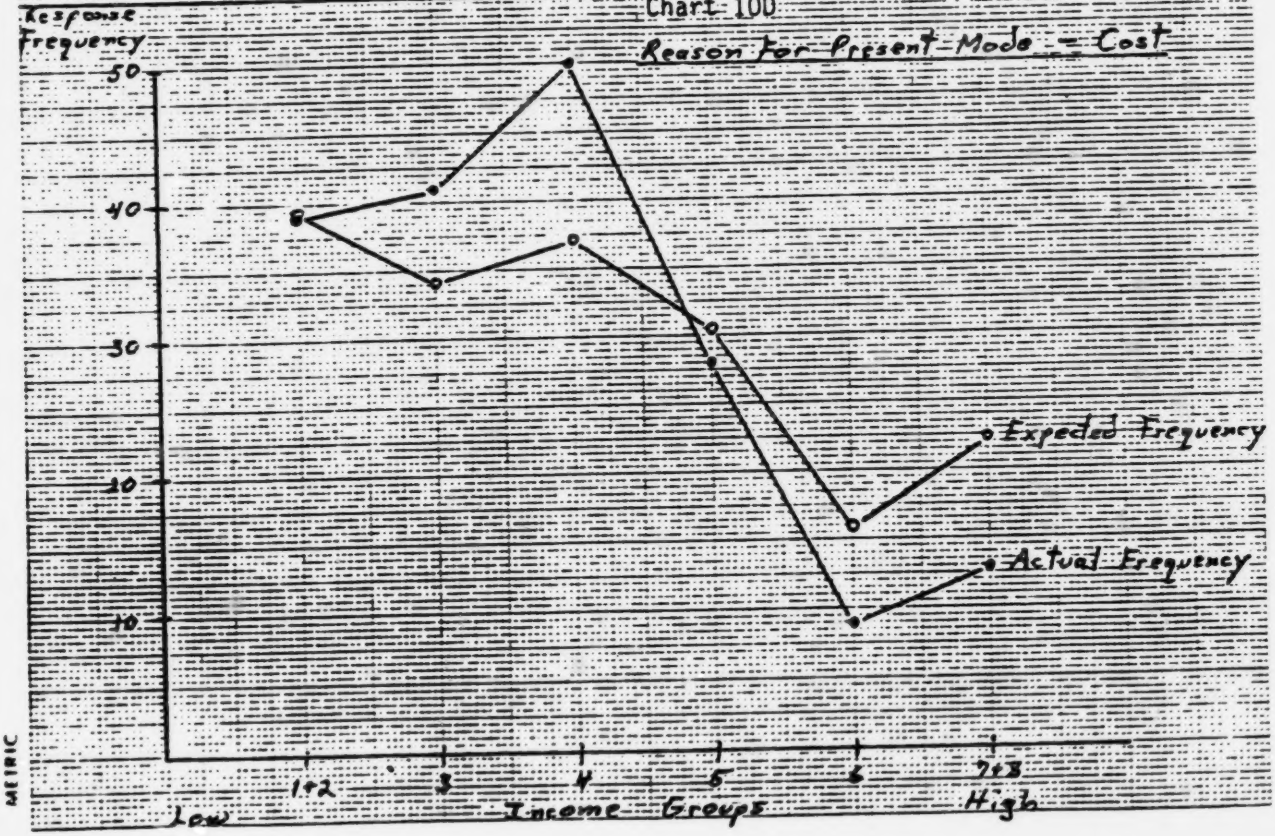


Chart 10D

Reason For Present Mode - Cost



conceivably 'locked into' the transit system and have little scope for different behaviour. The observed frequency of the third income group does not deviate substantially from the expected levels for any of the four reasons highlighted.!

!

The fourth income group appears to be significantly sensitive to poor bus service and to cost of the trip to work. Flexibility and availability of cars or drivers' licenses are not major issues for this group.!

!

The fifth income group is sensitive to flexibility but not particularly to the other three reasons.!

!

Groups 6 and 7 + 8 are particularly sensitive to flexibility but are either not sensitive or substantially below expected levels for the remaining factors.!

!

It is perhaps surprising that the lowest income group is no more likely than other groups to mention cost as a reason for present mode. Instead the middle income groups cite cost more often than the other groups, while the upper income groups cite it less often. It may be that cost only becomes a major consideration as one's income becomes sufficiently high to make a choice of mode possible, while for the much higher income groups it becomes unimportant. Upper income groups do, on the other hand, tend to value flexibility as well as short travel time and general convenience. Finally, it can be noted that middle income groups appear to be particularly sensitive to poor bus service. This result, along with the response pattern on the issue of cost, suggests that it is this middle income group (household incomes of $24,000 to $32,000) for whom the bus service's advantages and disadvantages are most crucial in their decision-making.

.2 Dislikes Concerning Present Travel Modes!

Employees were asked to specify the three things they disliked most about their current mode of travel. The question was open-ended with respondents choosing their own descriptors.!

!

The largest portion of responses to this question indicated respondents have no dislikes, about 28 percent of those responding. Other responses were grouped into categories with the following categories having the highest percentage responding:!

Lengthy Travel Time	(12.3%)!
Heavy Traffic	(11.9%)!
Crowded Bus	(9.1%)!

!

Cross tabulations were carried out in order to examine the effects of location, sex, and income on responses to this question. (See Charts 11A, B, C). It was found that at Great West Life, a higher proportion of employees indicated dissatisfaction with travel time, bus crowding, bus service, and weather conditions. Inkster Park employees (who are predominately auto-drivers) were more likely to indicate no problem with their present mode. This suggests that automobile drivers are more satisfied with their present mode than bus riders, at least when parking is adequate.!

!

A number of significant differences were found between male and female employees. Women were much more likely than men to indicate unhappiness with travel times and bus crowding, while men were more likely to indicate heavy traffic and travel cost as their primary dislike. This is in keeping with the finding discussed above that women are more likely to be bus riders than men. These

Chart 11A

Greatest Dislike Concerning Present Travel Mode
By Location

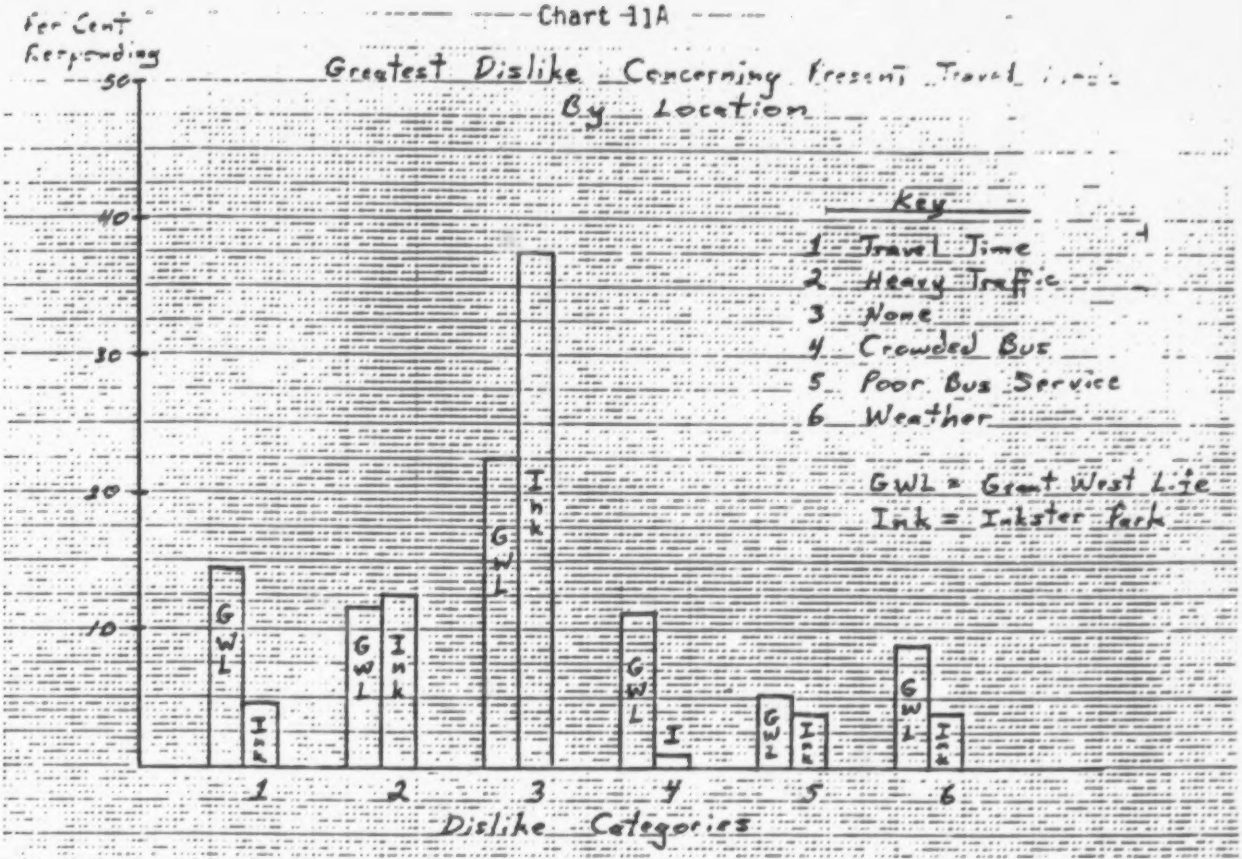


Chart 11B

Greatest Dislikes Concerning Present Travel Mode - By Sex

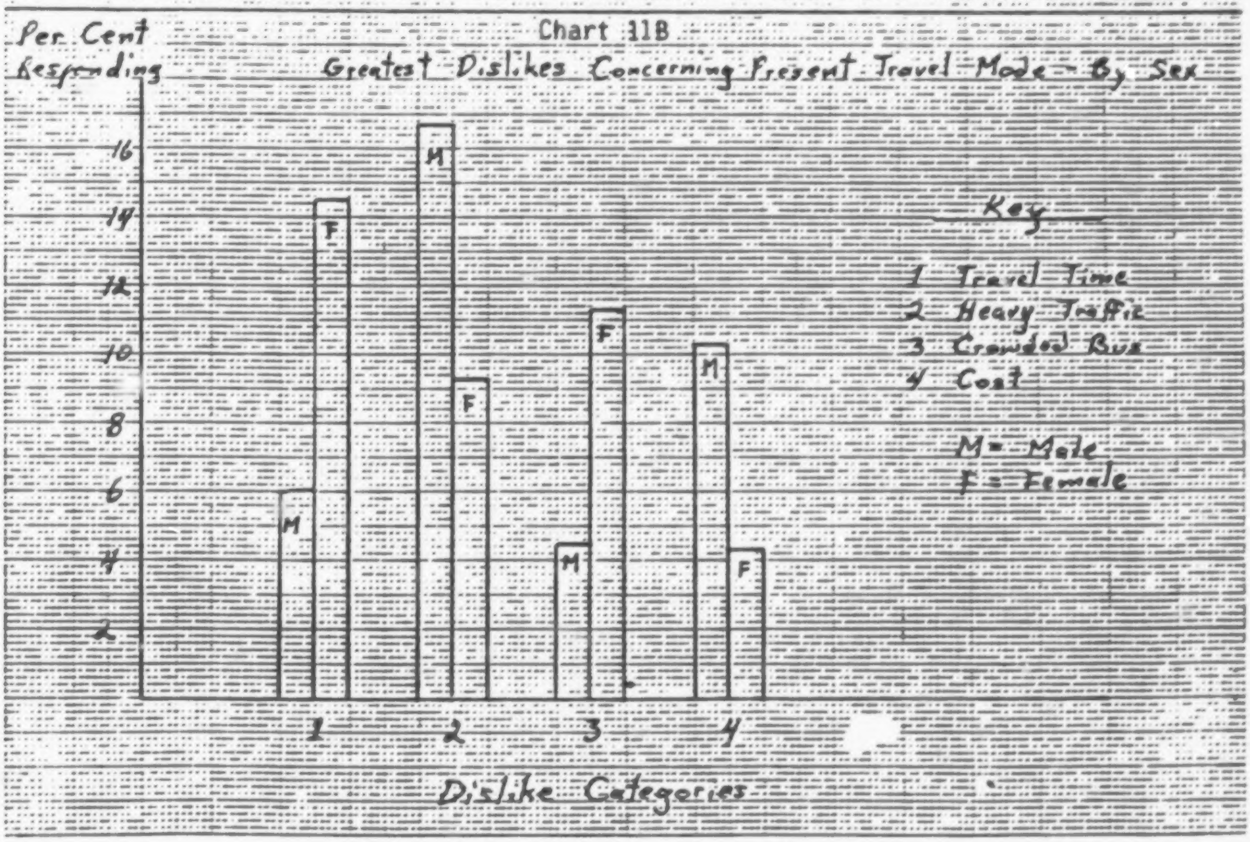
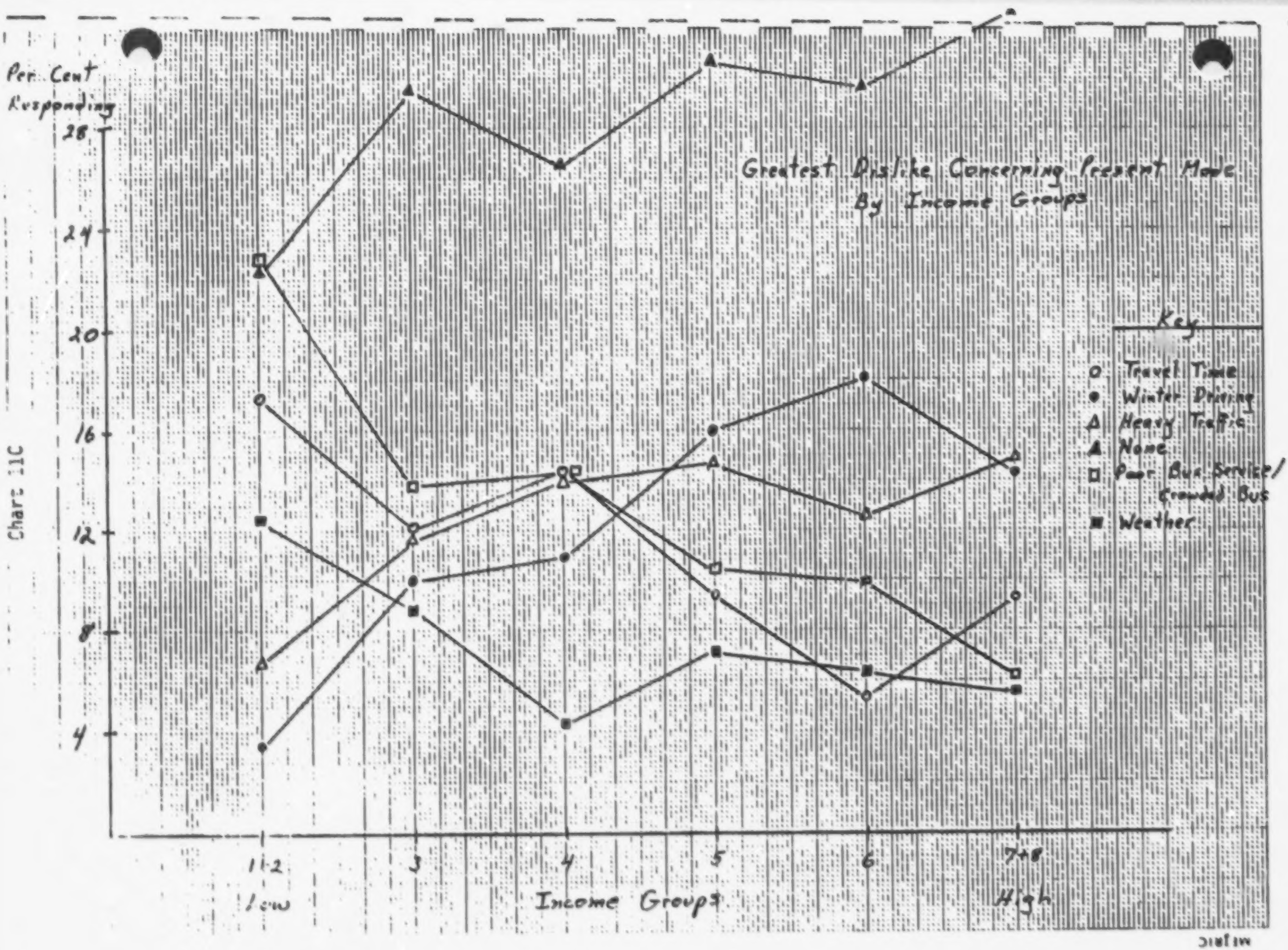


Chart 11C



Greatest Dislike Concerning Present Move
By Income Groups

differences were all found to be significant at better than the 95% level of probability.!

!

The dislikes of employees from different income groups were also compared. Chi-squared tests on the data presented in Table 6 indicated significant relationships between income and dislikes, and six major dislikes were charted over six income groupings. For this purpose, the two responses involving transit service were combined. No dislikes was a frequent response across all income groups, but was found to increase as income increases. The two response categories which are directly related to travel by automobile, winter driving and heavy traffic, also increase as household income increases. These two factors increased from a combined frequency rate of about 10 percent of the lowest income group's responses, to about 29 percent of the highest group's responses.!

!

Categories related directly or indirectly to use of the transit system showed the opposite trend, most markedly for the "Poor bus service/crowded bus" category. The response rate for this category was found to decrease from 22.6 percent of the lowest income group's responses to 6.2 percent of the highest income group's responses.!

Table 6

Greatest Dislike Concerning Present Mode
By Income Groups
(Selected Dislike Categories)

Dislikes	1 + 2	3	4	5	6	7 + 8	Total
	Income Groups						
Travel Time	49	29	37	20	6	15	156
Winter Driving Conditions	10	24	28	34	20	23	139
Heavy Traffic	19	28	36	29	14	24	150
No Dislikes	63	65	71	65	33	53	350
Crowded Bus	42	23	22	13	8	7	115
Poor Bus Service	22	10	15	9	3	3	62
Cost	8	13	14	20	12	14	81
Weather	35	21	11	15	7	9	98
Total Sample	283	240	257	212	111	161	1264

$\chi^2 > 106.2$

$\chi^2_{65,\ .05} = 84.8$

3.3 Most Desired Travel Characteristics!

Question number 10 of the questionnaire asked respondents to identify their three greatest travel preferences from a list of characteristics presented in the previous question. The characteristics mentioned most often are listed in Table 7. These responses were further analyzed by location, sex and income variables. Significant differences between sub-groups which showed up may be seen in Charts 12A, B, and C.!

!

Significant differences between the employees at the two locations showed up for five of the characteristics. Inkster Park employees were more likely to rate door to door transportation, non-stop transportation, and readily available transportation highly, than were Great West Life employees. These characteristics are most typical of travel by private automobile. Great West Life employees, on the other hand, rated low cost and time flexibility more highly than did the Inkster Park group. Since low cost is associated with bus travel, this finding provides tentative evidence that preferences are affected by present travel modes.!

!

Significant differences were also found between men's and women's responses to this question. Women mentioned door to door travel, low cost, and freedom from maintenance responsibilities more often than men, while men were more likely to list freedom to choose times, vehicle availability, and non-rush hour travel as most desired characteristics. The characteristics associated with men more than women all suggest more flexible or unpredictable work patterns, probably reflecting the much higher proportion of men in managerial or executive jobs. (See Table 8).

!

Table 7

Most Desired Characteristics of the Trip to Work

Great West Life and Inkster Park

		Overall Percent	G.W.L. Percent	Inkster Percent	Difference	Confidence Interval
1.	Short Travel Time	18.7	19.0	17.9	1.1	±2.9
2.	Door to Door Transportation	15.2	14.3	18.3	-4.0	±3.0
3.	Low Cost	11.0	11.7	8.5	3.2	±2.1
4.	Freedom to Choose Times	10.9	12.1	7.1	5.0	±2.0
5.	Direct, Non-stop	9.4	8.8	11.4	-2.6	±2.2
6.	Freedom to Make Stops	9.3	9.7	8.1	1.6	±2.0
7.	Vehicle Readily Available	9.0	8.4	11.0	-2.6	±2.3
	Other Characteristics	17.1				

Chart 12A

Comparison of Most Desired Characteristics
Great West Life vs. Inkster Park

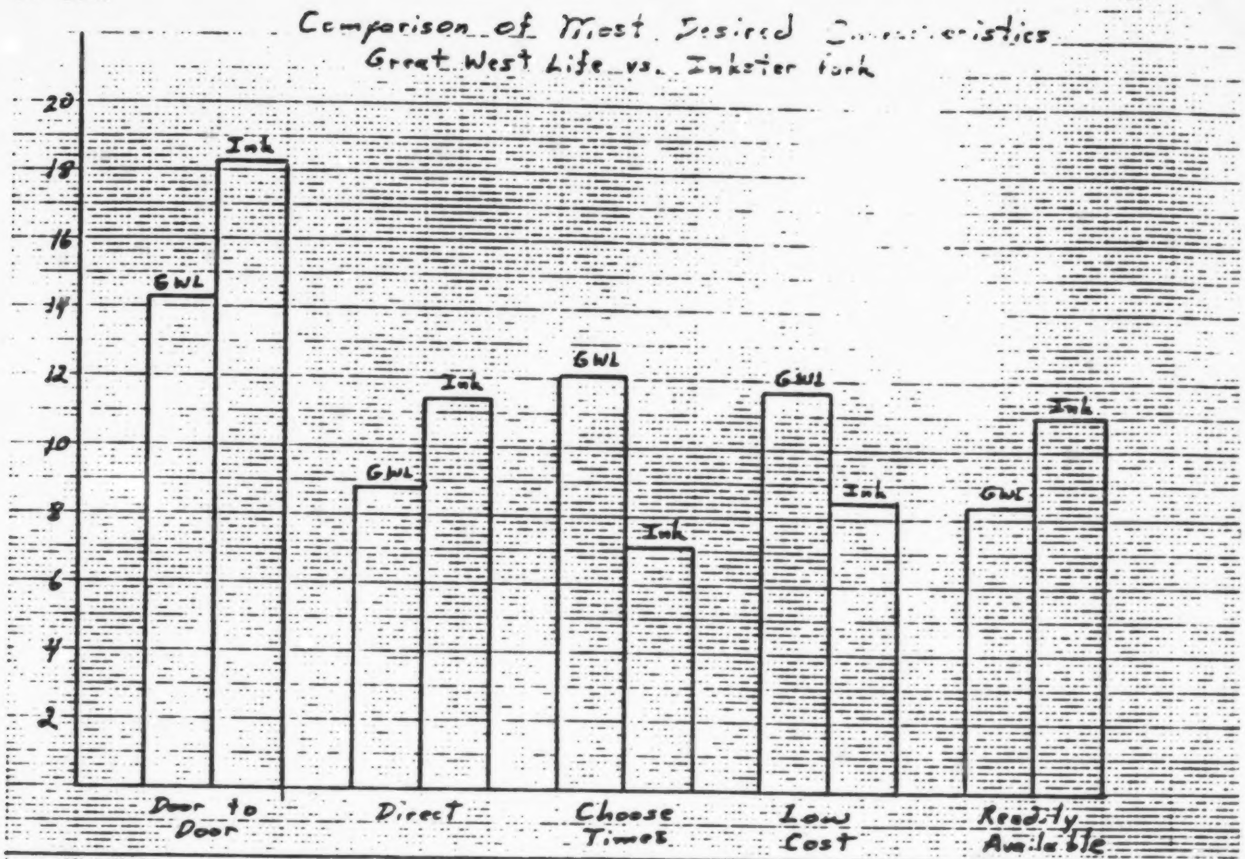


Chart 12B

Comparison of Most Desired Travel Characteristics
By Sex

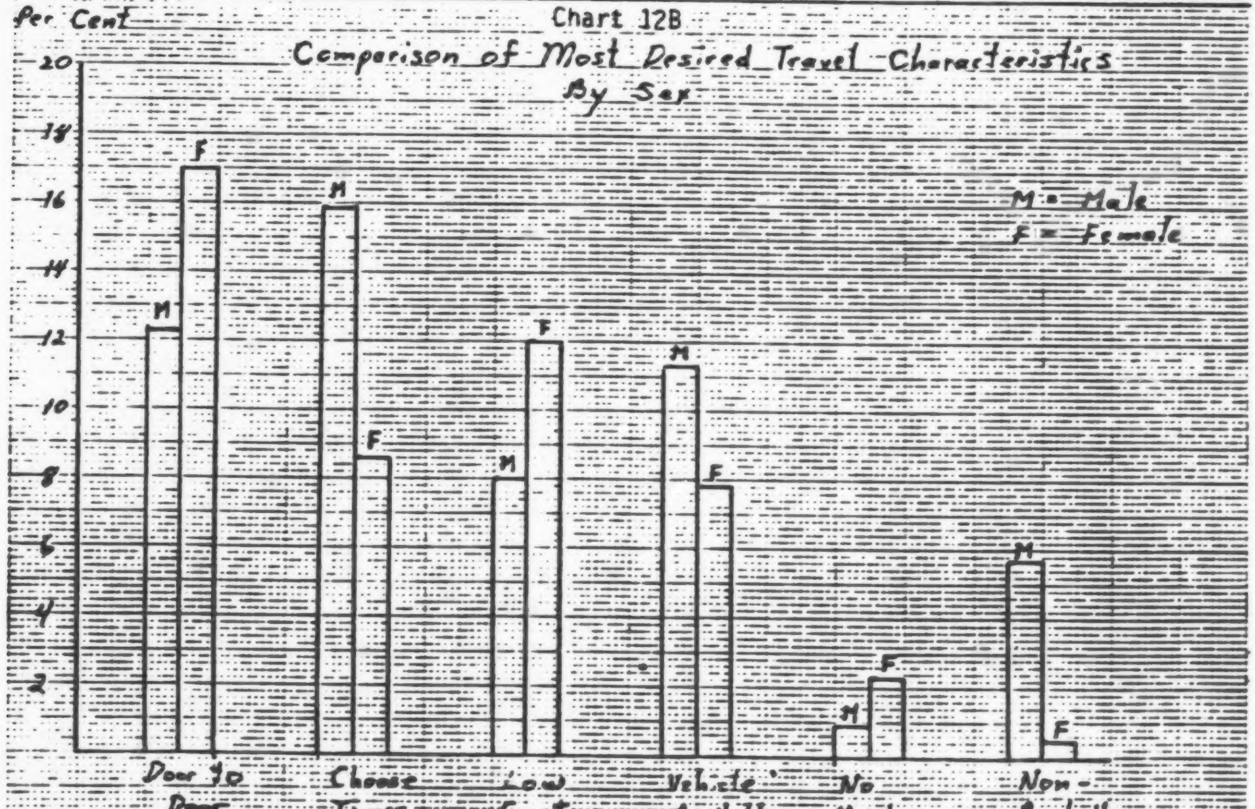
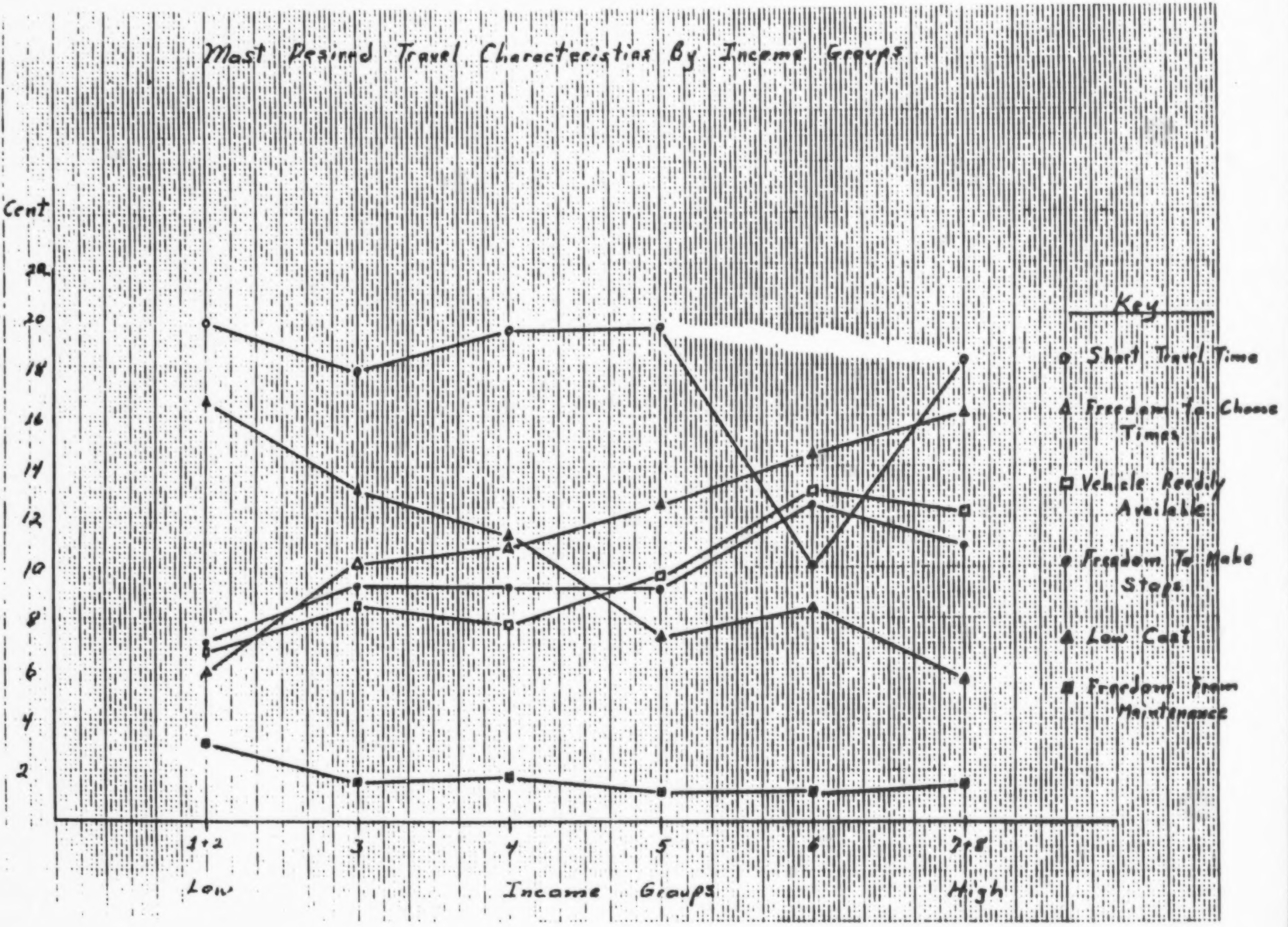


Chart 12C



Most Desired Travel Characteristics By Income Groups

Table 8

Most Desired Characteristics of the Trip to Work

Selected Characteristics by Sex

	Percent			
	Men	Women	Difference	Confidence Interval
Door to Door Transportation	12.3	17.0	-4.7	±2.2
Freedom to Choose Times	15.9	8.6	+7.3	±2.2
Low Cost	8.0	12.0	-4.0	±1.9
Vehicle Readily Available	11.3	7.8	+3.5	±1.9
No Maintenance Responsibility	.9	2.3	-1.4	± .7
Non Rush Hour Travel	5.7	.5	+5.2	±1.3

Responses to this question were also compared across the six income groups indicated above. Significant differences were found among income groups (see Table 9), particularly in the frequency of responses indicating low cost, freedom to choose travel times, need for vehicle readily available, and freedom to make stops. Of these four items, the first, low cost, was negatively correlated with income as expected. The probability that respondents would indicate the other three characteristics increased as the income level rose. A significant but less pronounced pattern showed greater likelihood for low-income workers to list freedom from maintenance as a priority for their travel mode.

4.3.4 Preference Cluster Factors

The preferences which are listed in question 9 in the questionnaire identify a number of ideal characteristics which are not associated with any one particular mode. In order to group the responses to these characteristics and attempt to identify meaningful underlying preferences which may have influenced the responses, the technique of factor analysis was used. The analysis identified eight different factors for each group of employees (Inkster Park and Great West Life), which together account for about 75 percent of the total variance in response to question 9. The eight factors identified for Inkster Park employees correspond closely to the eight factors for Great West Life, but are not identical. Table 10 lists these factors and the preferences with which they are correlated for each employee group.

Table 9

Most Desired Travel Characteristics
By Income Groups

Travel	Income Groups						
Characteristics	1 + 2	3	4	5	6	7 + 8	Total
Door to Door	124	95	123	102	52	58	564
Direct	85	61	74	66	24	33	343
Short Time	158	124	148	125	35	85	694
Freedom to Make Stops	57	65	71	59	43	51	346
Freedom to Choose Times	47	71	82	80	50	75	405
Low Cost	133	91	86	47	29	26	411
Vehicle Available	53	59	59	62	45	57	335
No Maintenance	25	11	14	8	4	7	69
No Parking	23	20	20	17	10	6	99
Non Rush-Hour Travel	30	34	27	25	12	24	160
Total Sample*	803	696	761	642	345	467	3714

* The items above account for 92.2% of total responses.

X^2 >143.6 $X^2_{80,\ .05} = 101.9$

Table 10

Preference Correlations With Factors

Factor	Correlated Preferences*	Correlation Coefficient G.W.L.	Correlation Coefficient Inkster
A. Ideal Convenience - Low Cost	Freedom from maintenance	.736	.785
	Low cost	.673	.595
	Freedom from parking	.787	.584
	Freedom from driving	.399	.795
B. Flexibility - Mobility	Freedom to make stops	.884	.890
	Freedom to choose times	.665	.847
C. Vehicle Accessibility	Vehicle readily available	.695	.818
	Door to door transportation	.651	.807
D. Short, Direct Travel	Direct, non-stop transportation	.669	.710
	Short travel time	.847	.888
E. Group Travel - Arranged Travel	Prefer to have travel arranged	.834	.689
	Prefer to travel with others	.781	.805
F. Travel Alone - Space for Packages	Prefer travelling alone	.907	.723
	Need space for packages	-	.857
G. Accommodate Disability - Freedom from Parking	Accommodate disability	.980	.926
	Freedom from parking	-	.578
H. Non Rush-Hour Travel	Need transportation during off-hours	.968	.940

* Only preferences with correlations greater than .500 are listed.

!

It will be seen from the table that all factors except for F and G correspond closely between the two groups. The factors also seem to be meaningful. Factor A involves a set of characteristics which tend to be in opposition to the private automobile driver, and more closely aligned with bus or other alternative forms of transportation. Factors B, C, and D are more consistent with the car driver, and each identifies a particular aspect of transportation convenience. Factor E is suggestive of the van pool or dedicated bus, but is not inconsistent with normal bus travel. The remaining factors tend to emphasize single characteristics.!

!

Table 11 indicates the relative importance of these eight factors in explaining the variance in responses for each employee group. While factor A is the primary one for each group, factor B is second in importance at Inkster while factor E is second in importance at Great West Life. The high ratings of factors A and E at Great West Life would seem to reflect its downtown location, the greater use of the transit system, and downtown parking problems. This again suggests that existing modes of transportation are affecting the employees' conception of their ideal preferences.!

!

It will also be seen that the lowest three factors, while in different orders of importance, are the same at both locations, and may be considered as of secondary importance. They account for only 16 percent of the total variance, and are somewhat inconsistent between employee groups. Factors A through E will be further analyzed in section 4.5 below.!

Table 11

Preference Cluster Factors

	Great West Life		Inkster Park	
Factor Description	Variance Explained	Rank	Variance Explained	Rank
Ideal Convenience - Low Cost (D1)**	19.3%	1	20.8%	1
Flexibility - Mobility (D2)	9.4%	3	16.6%	2
Vehicle Accessibility (D3)	6.9%	4	9.8%	3
Short, Direct Travel (D4)	6.0%	5	6.8%	4
Group Travel - Arranged Travel (D5)	15.3%	2	6.6%	5
Travel Alone - (Space for Packages*)	5.5%	7	5.7%	6
(Freedom From Parking*) - Accommodate Disability	5.0%	8	4.7%	7
Non Rush-Hour	5.5%	6	4.5%	8

* Characterization applies only at Inkster Park

** The designation D1 through D5 refers to dimension and is the terminology used to compare regression results in section 4.5 below.

4.4 Regression Analysis of Mode Choice!

Multiple linear regressions of mode choice probabilities as dependent variables and the questionnaire response variables as independent variables were run to determine significant influences on this choice process. The independent variables are identified in Table 12. The results of the regressions are summarized in Table 13.!

!

The table of results indicates that the linear regressions performed relatively well particularly at the Great West Life location. The R^2 and t-statistics are reassuring. A priori it was anticipated the multivariate logit would be required given the distribution of the mode choice probabilities. The multivariate logit is not available on the University of Manitoba's computing system.!

!

4.4.1 Car Driver - Only Occupant (P_1)!

For Inkster as well as Great West Life, car drivers (no passenger) to and from work tend not to pick up and drop off passengers during the day (X_1) but tend to pick up or drop off packages or attend to other business (X_2) to a very small extent. Those who gave "poor bus service" as reason for choosing their mode (P_1) tend to be drivers-only at Great West Life (but not at Inkster) to a very small extent (X_5) and drivers-only also give "flexibility" (X_4) and "short travel time" (X_6) as reason for mode. Job choice (Q4) has virtually no impact on P_1. Bus convenience (X_{13}, X_{14}) also have no impact. However X_{14} "convenience to bus stop" is highly significant for Great West Life although its coefficient is fairly small. This is probably due to the fact that relatively more car drivers (no passengers) at Great West Life tended to answer this question.!

Table 12

Definition of Variables Used in Regression Analysis

!

Q1!

$$P_1 = \frac{\text{\# of auto (only occupant) trips for any respondent}}{n_i}$$

$$P_2 = \frac{\text{\# of auto (driver with passenger(s)) trips for any respondent}}{n_i}$$

$$P_3 = \frac{\text{\# of auto (passenger only) trips for any respondent}}{n_i}$$

$$P_4 = \frac{\text{\# of bus trips for any respondent}}{n_i}$$

where n_i = sum of total of responses (for respondent).!

Q2!

X_1 = # of times respondent picked up or dropped off adult passenger(s) on way to work, lunch time, or on way home (Q2a), plus # of times picked up or dropped off child at day care centre, school, etc., on way to work, lunch time, or on way home (Q2b).!

X_2 = # of times respondent picked up or dropped off package(s) (Q2c), plus # of times went to another destination (Q2d), plus # of times respondent attended to other business.!

Q3!

X_3 = general convenience

X_4 = flexibility

X_5 = poor bus service

X_6 = short travel time

X_7 = share ride

X_8 = no car/don't drive

X_9 = cost

Table 12 (cont'd.)

Q4!

X_{10} = ease or availability of transportation affected work

X_{11} = major factor

Q5!

X_{12} = convenience of car parking spot

X_{13} = convenience of bus stop "to your home"

X_{14} = convenience of bus stop "to your work place"

Q6 Cost of travel to, from home (perceived cost)!

X_{15} = $ cost/week, for private auto

X_{16} = $ cost/week for bus

X_{17} = $ cost/week for shared auto (rider fee, etc.)

Q7 Perceived length of trip!

X_{18} = # of minutes to work

X_{19} = # of minutes from work

Q11

X_{20} = sex of respondent

Q12

X_{21} = age group

Q13

X_{22} = job classification

Q14

X_{23} = start (clock time)

X_{24} = end (clock time)

X_{25} = (X_{24} - X_{23}) hours - duration of work

Q15

X_{26} = car travel time (simulated)

X_{27} = bus travel time (simulated)

Table 12 (cont'd.)

Q16

X_{29} = total # of persons under 18 years of age

X_{30} = total # of persons over 18 years of age

Q17

X_{31} = # of persons in household with full-time paid employment

Q18

X_{32} = # of automobiles (trucks) owned and used by family

Q19

X_{28} = gross family income range

NOTE: Q8, Q9, and Q10 not used in regressions, since they are used to help the factor identification in the previous section.

!

Perceived travel cost to and from work (X_{16}, X_{17}) has a uniformly negative impact on being a "driver-only" at both Inkster Park and Great West Life. Auto cost (X_{15}), at Inkster Park, has no effect on P_1 while at Great West Life it is extremely significant with a relatively high positive impact. Perceived travel time (X_{18}, X_{19}) to and from work is insignificant at both points except for perceived travel time from work at Great West Life. Longer travel time tends to decrease the number of "drivers-only", probably due to rush-hour traffic at the downtown site. Males tend to be "drivers-only" at Inkster Park but not at Great West Life where sex has no impact. At Great West Life age (X_{21}) exerts a significant but low influence on P_1 but not at Inkster Park. "Drivers-only" also tend to own more cars (1 or more) at both sites (X_{32}) and have less individuals employed in the family.!

!

4.4.2 Car Drivers - With Passenger(s) (P_2)!

The most significant variable in this regression, with a very large and positive coefficient, is X_1, which provides a good check on the data since drivers with passengers evidently tend to pick up (or drop off) passengers to and from work, or during lunch hours. Variable X_7 (reason for mode is "share ride") is negatively related at Inkster Park while auto cost has a positive impact. At both sites drivers with passengers tend not to have children under 18, tend to be males at Great West Life, and at Great West Life tend to have slightly more individuals (probably spouses) employed (X_{31}).!

Table 13

Travel Behaviour - Trip to Work

	Independent Variables		P_1 (Driver Only)		P_2 (Driver & Pass.)		P_3 (Passenger-Car)		P_4 (Bus Pass.)	
			I.P.	G.W.L.	I.P.	G.W.L.	I.P.	G.W.L.	I.P.	G.W.L.
Q1	(passengers	X_1	$-.25^{+}$	$-.21^{++}$	$.51^{++}$	(.51)	$-.08^{*}$	$-.07^{**}$	-	$.07^{+}$
	(others	X_2	$.07^{*}$	$.03^{*}$	-	-	-	-	-	$.03^{*}$
Q3	(gen. conven.	X_3	-	-	-	-	$.28^{+}$	-	$-.11^{*}$	-
	(flexibility	X_4	$.14^{*}$	$.16^{+}$	$-.16^{*}$	-	-	-	-.09*	$-.05^{*}$
	(poor bus service	X_5	-	$.08^{*}$	-	$.08^{*}$	$.24^{**}$	-	$-.24^{+}$	$-.06^{*}$
	(short time	X_6	$.15^{*}$	$.08^{*}$	$-.17^{*}$	-	$.23^{**}$	-	$-.25^{+}$	$-.05^{*}$
	(share ride	X_7	-	$-.13^{+}$	$-.17^{+}$	-	$.29^{+}$	$.31^{++}$	-	-
	(no car	X_8	$-.22^{+}$	$-.10^{**}$	-	-	$.25^{+}$	$-.10^{*}$	-	$.25^{++}$
	(cost	X_9	-.11	$-.14^{+}$	-	-	$.15^{*}$	-	-	$.25^{++}$
Q4	(transportation	X_{10}	$-.09^{*}$	-	$.11^{*}$	-	-	-	-	-
	(affecting job choice	X_{11}	-	-	-	-	-	$-.05^{*}$	-	-
Q5b	(bus home	X_{13}	-	-	-	-	-	$.07^{*}$	-	$-.08^{+}$
	(bus to work	X_{14}	-	$.05^{**}$	-	-	-	-	-	$-.05^{+}$
Q6	(auto cost	X_{15}	-	(.38)	$.16^{**}$	-	-	$-.16^{+}$	$-.15^{+}$	(-.21)
	(bus cost	X_{16}	$-.13^{**}$	$-.07^{+}$	-	$-.07^{**}$	-	$-.10^{+}$	$.29^{++}$	(.20)
	(share cost	X_{17}	$-.17^{+}$	$-.06^{**}$	$.11^{*}$	$.12^{+}$	$.21^{+}$	$.19^{++}$	$-.13^{+}$	$-.13^{++}$
Q7	(time to work	X_{18}	-	-	$-.18^{*}$	-	-	$-.20^{+}$	$.37^{+}$	$.10^{+}$
	(time from work	X_{19}	-	$-.13^{**}$	-	$-.06^{*}$	$-.18^{*}$	$.15^{+}$	-	$.12^{+}$
Q11	Sex	X_{20}	$.15^{+}$	-	-	$.12^{+}$	$-.15^{**}$	$-.11^{+}$	$-.07^{*}$	$-.04^{*}$

Table 13 (cont'd.)

	Independent Variables		P_1 (Driver Only) I.P.	P_1 (Driver Only) G.W.L.	P_2 (Driver & Pass.) I.P.	P_2 (Driver & Pass.) G.W.L.	P_3 (Passenger-Car) I.P.	P_3 (Passenger-Car) G.W.L.	P_4 (Bus Pass.) I.P.	P_4 (Bus Pass.) G.W.L.
Q12	Age	X_{25}	-	$.04^{*}$	-	-	-	-	-	$-.05^{+}$
	(simulated) (car time)	X_{26}	$-.16^{+}$	-	-	-	-	$-.11^{*}$	$.16^{**}$	-
	(simulated) (bus time	X_{27}	$.16^{*}$	$-.11^{**}$	-	-	-	$.13^{*}$	$-.24^{+}$	-
	Income	X_{28}	-	-	-	-	$.11^{*}$	$.12^{+}$	-	$-.07^{+}$
Q16	(# under 18)	X_{29}	-	$.04^{*}$	$-.17^{+}$	$-.11^{+}$	$.10^{*}$	-	-	$.04^{**}$
	(# over 18	X_{30}	-	-.06*	-	-	-	-	$.11^{*}$	$.08^{+}$
Q17	# employed	X_{31}	$-.14^{*}$	$-.13^{+}$	-	$.08^{**}$	$.12^{*}$	$.11^{+}$	-	-
Q18	# autos	X_{32}	$.23^{+}$	$.22^{++}$	-	-	$-.24^{+}$	$-.15^{+}$	$-.07^{*}$	$-.05^{**}$
		R^2	.48	.59	.34	.39	.31	.28	.65	.76
		F	7.06	45.43	4.03	19.92	3.50	12.20	14.29	96.84
Type I Error (2 tail)			.00	.00	.00	.00	.00	.00	.00	.00

Notes to Table 13

A linear regression of travel mode characteristics, controlling for socio-economic characteristics, on mode frequencies P_i. Significant coefficients are denoted as follows (t-statistics)

* = 1.20 - 1.89

** = 1.90 - 2.49

+ = 2.50 - 4.99

++ = 5.00 - 9.00

( ) = 9.01+

Insignificant coefficients are omitted, although all variables indicated above are used in the regression to control for bias.

4.4.3 Car Passengers (P_3)!

At both sites more car passengers tend to be women (X_{20}), irrespective of age (X_{21}). Travel expense naturally tends to be that of "shared auto, (rider) fee" (X_{17}) of Q6. They also do not tend to pick up or drop off people and/or packages during the day (X_1 and X_2). At Inkster Park their reasons for being passengers are "poor bus service" (X_5), "short travel time" (X_6), "share ride" (X_7), "no car or can't drive" (X_8) and "cost" (X_9), while at Great West Life no reasons for being a passenger are significant except "share ride" (X_7). High perceived car and bus costs tend to decrease the car passenger rate at Great West Life but have no effect at Inkster Park. The counter-intuitive result at Great West Life, however, could be due to the wording of Q6, since passengers would tend not to answer the bus cost and car cost part of the question, thus resulting in a zero value. Gross family income is positively related to being a passenger as is the number of employed individuals in the family. More car passengers are therefore working women (with or without children) whose husbands are also employed so that on the average, many women passengers are obtaining a lift from their husbands.!

!

4.4.4 Bus (P_4)!

Bus passengers tend to be women and tend to have children 18 years and over. Fewer bus passengers tend to give, as reason for their mode, "general convenience" (X_3), "flexibility" (X_4), "poor bus service" (X_5) (particularly at Inkster Park), and "short travel time" (X_6). Thus, in terms of reasons why the bus is taken we have those individuals who tend to view the bus as not being inconvenient and/or providing poor service but who nevertheless realize that a bus is not extremely flexible, and does not provide a quick ride (see also simulated travel times X_{26} and X_{27}). Family income exerts no influence at Inkster Park but does exert a significant influence at Great West Life. The most significant influences on the frequency of taking a bus at Great West Life are perceived auto and bus costs (X_{15} and X_{16}). The results are counter intuitive but may be due, again, to the wording of Question 6 (see mode 3 above).!

!

4.4.5 Conclusions - Travel Modes!

The regression analysis of trip to work behaviour reveals several interesting points about the characteristics of those who use different modes. First, in general, it appears that women are more likely to be either car or bus passengers at both locations, while men are more likely to be drivers. Second, there is a clear relationship between car ownership and mode of travel. Those who drive without passengers own more cars, while car and bus passengers own fewer cars. However, since car passengers have higher incomes and bus riders have lower incomes, the car passenger group has apparently decided to own fewer cars and and economize on the trip to work.!

!

Third, the correspondence between the two locations of the characteristics of those who drive is not very great for car drivers, but is particularly strong for car passengers. Since the two locations are quite different in their transportation characteristics, this may be a finding which can be generalized to other situations - car passengers tend to be female, have higher household incomes, have more employed in their families, and own fewer cars. This is consistent with the family with two working parents, where the wife catches a ride to work with her husband or a co-worker. If ride-sharing is to increase it may be necessary to extend participation beyond this group to lower income families, to those with only one employed person, and to men. There is no apparent reason for those with fewer employed in the family to require more automobiles. This group would seem to be a logical target group for expanding the ride-sharing market.!

!

4.5 Regression Analysis of Preference Structures!

A series of regressions were carried out, with the factors as dependent variables, to observe whether (i) combinations of "ideal" trip characteristics are significantly explained by existing (actually used) modes; (ii) to determine which personal and socio-economic variables significantly explain the "ideal" trip characteristics. The independent variables for the regression are presented in Table 12 along with the relevant question number.!

!

The variables are estimates of probabilities of making a trip by a certain mode per individual. Due to the large number of zeroes, pedestrian modes (Q1) were not used in the regressions.[1] Also, all missing entries are replaced by zeroes meaning mode not used.!

!

---

[1] When a variable has extremely small variance it becomes highly "correlated" with the constant term, resulting in the same symptoms as multicollinearity.

Variables X_1-X_{31} represent explanatory variables for which observations were obtained from the questionnaire. The variables may be interpreted by comparing Table 12 with the questionnaire attached as Appendix A. A few relevant comments to aid in interpretation are outlined below.!

!

Variables X_1 and X_2 are summations of behaviour questions asked in Q2. X_1 represents all "side trips" involving passengers at all three time periods. X_2 represents all types of stops not involving passengers at all time periods. This aggregation was necessary because of sparseness of results.!

!

Variables X_3-X_9 and X_{10}, X_{11} are for questions Q3 and Q4 respectively. These variables were included as dictomous variables.!

!

Variable X_{12}, X_{13}, X_{14} are responses to Q5 and rank convenience in decreasing order over a range of 1-5. Variable X_{12} had a large number of missing observations largely because the parking lot convenience question was worded for response by car drivers only.!

!

Variables X_{26} and X_{27} are simulated travel time variables. The observations for the simulation are obtained from the responses to Q15 which asked for the respondent's home postal code. Knowledge of the postal code enabled us to locate the respondent in one of the traffic zones specified by the City of Winnipeg Transportation Department.!

!

Knowledge of the traffic zone location of the employer permitted the establishment of zone centroid to zone centroid travel times by automobile and bus for the morning rush hour based on 1976 studies. These travel times then are used in the regressions as an index of convenience of the mode of car or bus travel.!

!

Variable X_{22} (job classification) had a very large amount of missing data. It thus had to be eliminated from the regression analysis.!

!

Variable X_{26} gross family income, was treated as a grouped variable per the groups illustrated in the questionnaire!

!

4.5.1 Regression Analysis of Ideal Characteristics Preference Structure!

As reported in Section 4.3 the responses to Q9 were analyzed using the technique of factor analysis to create indices of the preference structure. In order to investigage the behavioural determinants of these preferences (or "ideal modes") multiple linear regressions were estimated using the individual, lcoation-specific factor scores of Table 10 as dependent variables.!

!

Three sets of regressions were run for each location-specific factor. The first set utilized only the frequency of a respondent choosing a particular major mode as the independent variables (P_1, P_2, P_3, P_4). The second set included all other variables (except X_{23}, X_{24}, X_{25}) together with major mode frequency variables to determine significant/insignificant explanatory variables. In the third stage variables which exhibited significance levels (t-values) of less than 1.2 were omitted and the results are given in Table 14. Prior to estimating the regressions two potential independent variables were deleted due to a very high proportion of missing data (parking convenience X_{12}; job classification X_{22}). The broad interpretation of the regressions is that the coefficients of independent variables statistically different from zero provide an indication of the general tendency of respondents associated with a particular factor index to provide various types

Table 14

Ideal Travel Characteristics

Explanatory		Dimensions									
		D_1		D_2		D_3		D_4		D_5	
Variables		IP(F_1)	GWL(F_1)	IP(F_2)	GWL(F_3)	IP(F_5)	GWL(F_2)	(F_4)	GWL(F_5)	IP(F_3)	GWL(F_4)
Q1	(P_1)	-	$-.29^{+}$	-	$-.18^{+}$	-	-	-.29*	$.22^{+}$	$.45^{+}$	$.56^{++}$
	(P_2)	-	$-.20^{+}$	.17*	-	-	-	-	.10*	.17**	$.34^{++}$
	(P_3)	-	-.07*	-	-	-	$.16^{+}$	-.25**	.11**	.15*	.28**
	(P_4)	-	-	-	-	-	-	-	.13*	-.17*	.09*
Q2	(X_1)	-.11*	-	-	.07*	-.15*	-	-	-.07*	-	.09**
	(X_2)	-	-	-	$.19^{++}$	-.13**	-	-	-.07**	-	-
Q3	(X_3)	-	.16**	-	-	.18*	-	.09*	-	-	$-.15^{+}$
	(X_4)	-	-	-	-	19**	-	-	-	-	$-.14^{+}$
	(X_5)	-	$.18^{+}$	-.14**	-.06*	.25**	-	-	-	-	$-.15^{+}$
	(X_6)	-	.14**	-	-	.23**	-	$.22^{+}$	-	-	$-.19^{+}$
	(X_7)	-.15**	.09*	-	-	-	-	.12*	-	.07*	$-.10^{+}$
	(X_8)	-	.11*	-.20**	-	.15*	-	-	-	.16**	-
	(X_9)	-	.22**	-	-	-	-	-	-	-	$-.13^{+}$
Q4	(X_{10})	-	.06**	-	-	$.18^{+}$	-	-	-	-	-.06*
	(X_{11})	-	-	.11*	-	-	-	$.19^{+}$	-	-	.08*
Q5	(X_{12})	-	-	-	-	-	-	-	-	-	-
	(X_{13})	-	$-.16^{+}$	-	-	-	-	-.21**	-	-	$.10^{+}$
	(X_{14})	.12*	-	-	-	-	-	.18**	-	-	-
Q6	(X_{15})	.16**	-	-	-	.18**	-	.17**	-	-	-
	(X_{16})	-.20**	$.11^{+}$	-	-	-	-	-	-	-	-
	(X_{17})	.11*	-	-	-	.17**	-	-	-	-	-.08*

Table 14 (cont'd.)

Explanatory		D_1		D_2		D_3		D_4		D_5	
Variables		IP(F_1)	GWL(F_1)	IP(F_2)	GWL(F_3)	IP(F_5)	GWL(F_2)	IP(F_4)	GWL(F_5)	IP(F_3)	GWL(F_4)
Q7	(X_{18})	-	-	-	-.09**	-	-	-.11*	-	.19*	-
	(X_{19})	-	-	-	-	-	.08**	-	-	-.22*	-
Q11	X_{20}	-	-.11$^+$	-	-	-	-.05*	-	-	-.13**	-.09$^+$
Q12	X_{21}	-	-	-	-	-	-.06*	-.22$^+$	-	-	-.13$^+$
Q13	X_{22}	-	-	-	-	-	-	-	-	-	-
Simu- lated	(X_{26})	-	-	-	-.15**	-	-	-.26*	-	.08*	-
istance (Time)	(X_{27})	-	-	-	.13**	-	-	.26*	-.12*	-	-
Q19	X_{28}	-.23$^+$	-.08**	.12*	-	-	-.07**	-	-	-	-
Q16	(X_{29})	.15**	-	-.15**	-	-	-	-	-	-	-
	(X_{30})	-	-	-	-.06*	-	-	-	-	-	-
Q17	X_{31}	.18**	-	-.17*	.06*	-	-	-	-	.25$^+$	-
Q18	X_{32}	-.12*	-	-	-	-	-	-.17**	.06	-	-
	R_2	.21	.25	.12	.14	.16	.09	.20	.03	.21	.21
	F	2.72	14.37	2.20	10.09	2.42	9.87	2.44	2.07	5.53	13.08
Type I Error (2 tail)		.00	.00	.01	.00	.00	.00	.00	.01	.00	.00

Notes to Table 14

The entries in the table represent significant, *standardized* regression coefficients Slopes where t-statistic significances lie in the internal 0-1.19 are denoted by a dash, those with t-values in the range 1.20-1.90 are marked by an asterisk (*), coefficients where

Table 14 (cont'd.)

significance levels between 1.91-2.49 are marked by a double asterisk (**) while t-values of 2.50 or greater are distinguished by a dagger (+) and t-statistics in excess of 5.00 are marked as (++). !

!

Note that a (-) denotes an insignificant regression coefficient as computed in the second and third stage regressions. Given that multicollinearity is here not a major problem such a method represents a fairly efficient procedure for increasing significant explanatory variables.

of information with respect to specific questions on the questionnaire form.!

!

4.5.1.1 Ideal Convenience - Minimum Cost Index (D_1)!

The first factor index considered is the "ideal convenience - minimum cost" index which is the first order factor at each of Inkster Park (IP) and Great West Life (GWL). This factor has loadings on characteristics related to "freedom from having to drive", "freedom from vehicle maintenance and operation", "freedom from parking space arrangements", and "minimization of travel costs". (See Table 10).!

!

While at Inkster Park actual major modes exert no influence on D_1, at Great West Life the car modes are all significant with bus (P_4) having no influence. The socio-economic variables are also different for the two sites. At Inkster sharing a ride (X_7), bus stop convenience (X_{14}), private auto cost/week (X_{15}), shared car cost/week (X_{17}), number of persons under 18 years of age (X_{29}) and number of persons in household with full-time income (X_{32}) tend to score positively on D_1 while number of times adults or/and children were dropped off (X_1), cost of bus rides/week, family income (X_{28}) and number of cars/trucks owned exert a negative influence on D_1. At Great West Life, however, car modes (P_1, P_2, P_3) are all significant and negative as is Sex (X_{20}) and Gross family income, while most variables defined for Q3 (X_3, X_5, X_6, X_7, X_8, X_9) as well as weekly bus expense (X_{16}) are positive. Respondents who score highly on D_1 therefore tend to have fewer cars, more children in the family, be female, and have lower incomes.!

!

4.5.1.2 Flexibility-Mobility Index (D_2)!

At Inkster respondents who frequently drive a car (with passenger) tend to regard flexibility-mobility as relatively important while at Great West Life it is the car drivers without passengers who view flexibility-mobility in this way.

At Inkster, car passengers, respondents for whom availability of transportation was a major factor in work decision and those with higher incomes tend to score positively on D_2. At Great West Life car drivers (P_1), people who drop off adults/children and/or packages, with longer bus travel time score low on D_2 while those whose reason for major mode is "poor bus service" and whose perceived length of trip to work and real car travel time is longer tend to score lower on D_2.!

!

4.5.1.3 Group Travel - Freedom From Arrangements Index (D_3)!

The third factor index has been identified as the "Group travel - freedom from arrangements index". This index represents the fifth order factor at Inkster Park and the second order at Great West Life. The significant loadings at each location are "prefer travelling with other people", "prefer to have travel arrangements handled by someone else" and to a lesser extent "freedom from having to drive". (See Table 10) All major mode frequencies are insignificant with the exception of car passengers (P_3) who tend to score higher on D_3 indicating perceived importance.!

!

4.5.1.4 Short, Direct Travel (D_4)!

Inkster and Great West Life tend to be very different, with respect to all variables which are found to be significant to D_4. At Inkster both car drivers (no passengers) as well as car passengers view D_4 as unimportant while at Great West Life respondents using the same major modes view D_4 as relatively important. Actually at Great West Life all four major users report high importance for D_4, as do those who own more cars/trucks. However, controlling for major mode, respondents who pick up adults, children and packages respond lower on D_4 as do people who face a long bus trip (X_{27}). At Inkster again, reasons for major mode (X_3, X_6, X_7) exert a positive influence on D as do X_{11}, X_{14}, X_{15}, X_{21}, and X_{27}.!

4.5.1.5 Door-to-Door Transportation (Between Home and Work) and Availability of Vehicle (D_5)!

It is only for D_5 that the major-mode variables agree for both Inkster and Great West Life. The Great West Life sample especially registers significant results for all four major modes. At Great West Life virtually all variables defined over Q3 are negative and significant as are the remaining variables in the equation (X_{16}, X_{17}, X_{20}, and X_{21}). X_1, X_{11} and X_{13} are positive.!

!

4.6 Conclusions and Policy Implications!

!

4.6.1 Test of Hypotheses!

Two central hypotheses have guided this study. First, it was suggested that present modes limit consumers' awareness of alternative possibilities, and thereby shape their ideal preferences. Second, it was thought that socio-economic characteristics affect the consumers' transportation preferences.!

!

The first hypothesis may be looked at in two ways. By examining the preferences of those who currently use different modes we can see how consumers are influenced by the positive and negative aspects of the type of transportation they are most used to. In addition, we can examine the opportunities which present themselves to the consumer, and how those opportunities influence their ideal travel preferences.

!

The following discussion of preferences will provide the conclusions concerning these hypotheses in regard to three areas: present mode of transportation to work, transportation opportunity factors, and socio-economic variables.!

!

An examination of the regression analysis presented in Section 4.5 shows a number of correlations between present travel modes and responses to preferences.

Most of these correlations suggest that respondents indicated preferences which explained or justified their present mode of travel. Car drivers shows particularly high correlations at both employer locations with door-to-door transportation, as well as with short, direct transportation at Great West Life. Car passengers were likely to rate group/arranged travel highly at Great West Life, and bus riders at Great West Life were likely to rate door-to-door transportation lower. Car passengers at Inkster rated cost/convenience (which implies not driving oneself) highly, and car drivers at Great West Life rated cost/convenience lower. Such preference patterns clearly reflect the respondents' modes of transportation, controlling for socio-economic background.!

!

Two groups of relationships between transportation opportunities and preferences were also found: those which appear to rationalize present mode uses, and those which indicate dissatisfaction with present opportunities. While the former group is consistent with our hypothesis, the latter group provides insights which have more relevance from the perspective of developing transportation policy. Examples of the correlations which show dissatisfaction include the following:

i) At Great West Life, those who take their present mode due to poor bus service (presumably car travellers) are more likely to indicate a preference for the low cost - maximum convenience factor (D_1). This factor which encompasses freedom from driving, parking, and car maintenance, is inconsistent with their present mode of travel.

ii) At Inkster Park, the same group rates group travel/arranged travel (D_3) highly, suggesting that they would like to participate in some sort of transportation pool.

iii) At Great West Life and Inkster Park, those facing longer bus trips are more likely to prefer flexibility/mobility (at G.W.L.) and short, direct travel (at Inkster Park), which suggests that lack of adequate bus service leads to increased use of the automobile.

iv) Those taking their present mode because of poor bus service at Inkster Park are more likely to rate flexibility/mobility lower than other consumers, indicating that they take the car, not for its intrinsic advantages, but because of an inadequate alternative.!

!

With reference to the second hypothesis, relationships which were revealed in the regression analysis between socio-economic variables and preferences were not nearly as strong or extensive as expected. These results are, however, statistically significant, and the small coefficients may result from interactions among the socio-economic variables. However, those relationships that did appear fell neatly into two groups. Group A is characterized by being older, have a higher income, more likely to be male, and owning more cars. Those with these characteristics tend to prefer the flexibility/mobility (D_2) factor and tend not to prefer low cost/convenience (D_1) and door-to-door (D_5) factors.!

!

Group B includes those with more employed people in the household, and more family members under 18 years of age. They tend to have preferences for cost/convenience (D_1) and door-to-door transportation (D_5), while showing less likelihood of preferring the flexibility/mobility factor (D_2).!

!

Within Group A, there is an inconsistency between the age variable, which is co-related with short, direct travel (D_4), and car ownership, which is negatively correlated with the same factor.!

Aside from the specific implications of these various findings, it can be concluded that partial support for the two hypotheses has been found by this study. The strongest conclusion is that opportunity variables, such as location of work place in relation to residence, and exsiting transportation opportunities, tend to have a great influence on preferences, perhaps masking or overriding influences of socio-economic variables. However, it should be kept in mind that in the bivariate analysis described in Sections 4.2 and 4.3 a number of apparent socio-economic patterns were observed which are consistent with our hypothesis. Moreover, other research has been done establishing the importance of socio-economic variables in transportation behaviour.!

1) SCR *

!

4.6.2 Policy Implications!

The possible breadth and scope of policy implication from the study creates difficulties in structuring a focused statement of key options. For the purposes of this report, the following sections will focus on four principal groups: drivers without passengers, drivers with passengers, auto passengers and bus passengers. Policy implications which may be distinctive relative to one or the other of our employer locations will be identified.!

!

4.6.2.1 Driver Only!

This group constitutes the least energy efficient category of respondent and is thus worthy of priority attention. The magnitude of this group is higher at Inkster Park where about 40 percent of the respondents make ten or more such trips per week. At Great West Life the proportion is about 20 percent.!

!

The major policy implication for this group is that a high level of service would be required from an alternative mode.!

!

The importance of service related characteristics is emphasized by the fact that the probability of being a driver only is positively related to the number of vehicles owned by the respondent's household. This coefficient at both locations is highly statistically significant and of considerable magnitude.!

!

It is not clear whether a mode designed to capture this market group requires a set of characteristics which might be related to the sex of the respondent. At Inkster Park, respondents indicating a high probability of being a driver only tend to be male. At the same location those giving a high preference for the door-to-door transportation and availability of vehicle tend to be female.!

!

At Great West Life neither sex dominates the driver only category while females have a small relative preference for the D_5 set of factors. The importance of this perspective is reflected in the preference structure regression analysis in the magnitude of the coefficients for factors reflecting door-to-door transportation and availablity of the vehicle. In the travel behaviour regression analysis the importance of service levels is reflected by the coefficients on flexibility as the reason for using present mode with respect to Q3 of the questionnaire.!

!

Service factors related to short travel time and direct travel are less ? 5C'4 obviously important. In the travel preference regressions, they are positively related to mode choice at Great West Life but negatively related at Inkster Park. The short travel time reason for mode choice is positively related at Inkster Park in the travel behaviour regression and at Great West Life. The magnitude of the coefficient is relatively small, however, although it is statistically significant.!

!

Another implication for the driver only category at Inkster Park is the apparent irrelevance of the existing transit service. The reasons for current mode coefficients for flexibility and short travel time are of a substantial magnitude and somewhat statistically significant. Poor bus service, on the other hand, is not a statistically significant reason for being a driver only.!

!

4.6.2.2 Driver and Passenger!

Respondents who are currently providing ride sharing represent about 20 percent of the sample at each location. These respondents are indicating by their behaviour at least a potential acceptance of a formalized ride sharing or pooled vehicle mode. This potential should be considered further. First, much of the ride sharing presently takes place on a less than full time basis. Only about 10 percent of the respondents at each location were drivers with passengers ten or more times per week.!

!

Second, much of the ride sharing may involve participants from within a single household. At Great West Life for instance, the driver with passenger respondents tend to be male, while at both Great West Life and Inkster the auto passengers tend to be female.!

!

In terms of preference structures, the pattern of statistically significant relationships differs for this category of respondents between locations. Great West Life respondents in this category tend not to strongly prefer being free of vehicle operation, maintenance and parking issues. They do, to some extent, favour short, direct travel and do favour door-to-door transportation and immediate availability of vehicle.!

!

Inkster Park respondents tend to favour the flexibility and mobility characteristics to some extent as well as the door-to-door transport and availability of vehicle characteristic. Both have fairly substantial regression coefficients and the statistical significance of the latter is quite high. Inkster Park respondents in this group tend not to cite flexibility, short travel time or ride sharing as reasons for their present mode.!

!

The implication of these preference observations is that service standards required for this group of respondents may not be significantly less than for the driver only group. In fact, because passenger needs are considered a responsibility the driver wishes or feels obliged to fulfill, it may be necessary to provide the passenger with transportation service before the respondent would be receptive to alternative modes.!

!

4.6.2.3 Auto Passengers!

This group of respondents is almost as large as the number of drivers with passengers. At Inkster Park about 8 percent of the respondents use this mode ten or more times per week. The corresponding group at Great West Life is about 10 percent of the respondents.!

!

The comments concerning ride sharing within a household are applicable here as well. Additional research will be required to identify the extent of this factor.!

!

The implications for this group of respondents tends to differ from those of other respondents using automobile modes. In this case, many of the respondents could be utilizing the mode through lack of other opportunities. The implication seems particularly strong at Inkster Park.!

!

Auto passengers at Inkster Park tend to cite general convenience, poor bus service, short travel time and no car/can't drive as the reasons for their choice of mode. The positive coefficients on these variables are among the largest obtained in the mode choice regressions and tend to have a high statistical significance.!

!

Auto passengers at Great West Life do not tend to cite a particular reason for the use of the mode. There is a slight negative correlation between reporting no car/can't drive and the number of trips taken as a passenger at Great West Life.!

!

The implication that auto passengers lack alternative choices is reinforced by the observation that at both Inkster Park and Great West Life substantial negative regression coefficients were obtained on the number of auto variables. The absolute magnitude is substantially greater at Inkster Park.!

!

The preference structure again reflects an orientation of door-to-door service and vehicle availability dimensions. The magnitude of the coefficients is significantly below those for driver only, however, at both locations.!

!

Inkster Park car passengers tend not to rank short direct travel highly while those at Great West Life indicate a fairly substantial tendency to rate this characteristic highly. Great West Life respondents also have a fairly substantial tendency to prefer group travel without themselves having to make the arrangements.!

!

4.6.2.4 Bus Passengers!

The implications arising from the responses of the bus passenger group tend to differ between the locations. This is in line with a priori expectations given the substantial difference in service levels between the two locations.!

!

At Inkster Park bus passengers tend not to give convenience, flexibility, short travel time and poor bus service as their reason for mode choice. The negative regression coefficients are substantial in absolute magnitude and statistically significant (particularly on the poor bus service and short travel time). There is no statistically significant positve regression coefficients on any of the reasons for mode choice. This pattern of responses may reflect a lack of options for these respondents. If this interpretation is correct, the implication for the transit system would be that improvements in the option set avaiable would result in a modal choice not involving the transit system.!

!

At Great West Life, the primary reasons given for being a bus passenger are no car and cost. Given the range of bus service available to Great West Life respondents, it is difficult to know how to interpret these responses. For instance does work location and quality of bus service permit individuals to do without a car for the trip to work or do economic circumstances prohibit maintenance of a car and force bus use. Given that household income and number of vehicles have only small (but negative) coefficients it would appear that the former might be the case.!

!

Strong preferences covered by the preference indicies are correlated to the probability of being a bus passenger only in the case of D_5 (door-to-door and readily available) at Inkster Park. D_4 (short direct travel) and D_5 (door-to-door) are correlated with bus ridership at Great West Life.!

!

The relationship at Inkster Park is inverse and relatively substantial. The inverse relationship again probably reflects the fact that these bus riders have no other choice and do not have strong preference for particular travel characteristics.!

!

The Great West Life relationships are positive and of relatively substantial magnitude. Interpretation is again difficult. Many Great West Life employees could well be obtaining short direct transportation and virtual door-to-door service given Great West Life's location and the location of adjacent residential areas. Exact interpretation requires additional in depth analysis.! ? 5C 16 17

!

4.6.3 Target Group Identification!

In order to identify the potential for the development of alternative transportation modes for the two groups of employees, those who drive to work were singled out and sorted by traffic zones and preference factors. It was reasoned that if enough drivers with similar travel preferences live in a given area, the potential for some form of group travel option exists. Table 15 shows the results of this process for the two work locations.!

!

For the purpose of this analysis the two factors which seem most amenable to travel by modes other than the private automobile (D_1 and D_3) were combined, and the other three factors which seem to imply access to a car (D_2, D_4 and D_5) formed a second group. It is suggested that the drivers falling into the former group should be fairly receptive to such modes as car-pooling if a number of such individuals live in the same area. On the other hand, the latter group would be expected to require some convincing that an alternative transportation mode can meet their needs, that is, that it can be flexible, direct, or available enough for their purposes.!

!

Several issues must be kept in mind when looking at these results. First, the survey captured the views of only 62 percent of the total workforce at the cooperating employers, implying that the employer specific market may be larger. Second, other adjacent employers would offer an additional potential market for alternative transportation modes. Third, many employees may live in traffic zones which are arranged serially along major arteries. Thus it may be possible to assemble groups of employees from among several zones. !

!

It can be concluded that there is limited potential among the most likely group to adopt alternative modes, at both locations, but that there are a substantial number of clusters of employees with similar preferences who currently drive to work. If reasonably fast, flexible and efficient alternatives were opened, perhaps in combination with some form of incentive, it might be possible to gain the participation of a portion of this group. Particularly when it is seen that 18 or more drivers reside in the same traffic zone, the potential for finding one or more groups of 4, as might be appropriate for a car pool, seems quite realistic.!

Table 15

Traffic Zones With 5 or More Employees Who Drive to Work and Have Given Travel Preferences

	Number of Employees			
	Inkster Park		Great West Life	
Traffic Zone	D_1 or D_3	D_2, D_4 or D_5	D_1 or D_3	D_2, D_4, or D_5
141				11
152				11
270				8
340				15
351				18
370				23
450				5
470				12
520				12
550				5
591			5	12
662				18
670			12	31
760		6		18
843	6	19		
844	5	16		
852	21	39		

1.6.4 General Policy Implications!

The striking differences between the employees' mode choices and preferences at the two locations covered by this survey emphasize the importance of opportunity in transportation preferences and behaviours. Substantial dissatisfaction with the present opportunities have been identified, but this dissatisfaction appears to be concerned with a wide range of perceived problems, and reflects the situation of distinct sub-groups among the working population. At Great West Life, which is served by many bus routes, it appears that alternative forms of transportation such as van pools, jitneys, or dedicated buses offer the most hope of fulfilling some of the employees' unmet needs. At Inkster Park on the other hand, there seems to be substantial room for improvement of the bus system to capture part of the automobile group.!

!

The way in which this analysis has been structured tends to result in the identification of a number of smaller sub-groups of employees which are defined by common preferences, socio-economic characteristics, and behaviours. However, if larger populations of employees are considered, such as exist in the vicinity of both locations surveyed for this study, the potential market for alternative transportation modes is greatly increased.!

! Policy Implications!

* A reasonable testing of consumer demand for alternative work-trip modes requires an experimental approach. This appraoch would use data such as that provided in this study to define potential markets, and then select the most promising of these markets for further development.

* The variety of needs and behaviours identified in this survey point to the need for either a wide range of alternative modes of

transportation, or modes which are flexible enough to accommodate such different behaviours. Thus, smaller group travel is more likely to be successful than larger group modes. The need for flexibility also suggests that a more decentralized system will be more effective than a more centrally planned or scheduled one.

* The present frequency of shared work-trips as well as the preferences indicated by some employees for shared or arranged travel, indicates that the potential exists for employees to change their travel behaviour if options are made available.
* The need to serve the employees of several employers located at a specific location suggests a role for the municipal transit authority or other agencies to provide the service on a contract basis.
* Present transit system users should not be considered as a captive market. Those respondents using transit as a 'mode of last resort' may switch to other modes as circumstances permit. Conventional transit service could well be an inferior or Giffen good in the economists' jargon.

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APPENDICES

I. Present Travel Characteristics

1. During the past week, how many trips to or from work did you make of each of the following types? (Count each one-way trip.)

Private auto-only occupant	____ trips
Auto-driver with passenger(s)	____ trips
Auto-passenger	____ trips
Taxi	____ trips
Bus	____ trips
Walked	____ trips
Other (specify) ______________________	____ trips

2. How many times last week did you do any of the following at the times indicated? (Circle one number in each box.)

	On the way to work	At lunch time	On the way home
a) Pick up or drop off adult passengers	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
b) Pick up or drop off child at day care, school or babysitters?	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
c) Pick up or drop off packages	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
d) Go to another destination (for recreational, educational or other purposes)	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
e) Attend to other personal business	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5

3. Why do you use your present methods of transportation to and from work?

____

____

____

____

4. When you applied for your present job did the ease or availability of transportation to work affect your decision?

___ yes ___ no

Was it a major factor?

___ yes ___ no

5a.) If you presently drive an automobile to work, please rank the convenience of your car parking spot to your work place. (Circle appropriate number)

Convenient 1 2 3 4 5 Inconvenient

5b.) How convenient is the bus stop?
(Please check below the appropriate number)

	Do not know Location of stop	Convenient 1	2	3	4	Inconvenient 5
to your home?	____________					
to your workplace?	____________					

6. What do you think it costs per week for your travel to and from work? (Complete methods you use)

Private auto (include fuel, parking, insurance) $______________

Transit (bus pass or cash fare) $______________

Shared auto (rider fee, etc.) $______________

7. How long does the trip usually take (From door to door)

_____ minutes to work _____ minutes from work

8. What do you most dislike about your present method of travelling to work? (Put your greatest dislike first.)

1. ____

2. ____

3. ____

II. Travel Preferences

9. Think about your trip between home and work. If you could describe the best way for you to travel to and from work, how important would each of the following items be? (Place check mark below appropriate numbers.)

	Very important 1	2	3	4	Not important 5
A. Door to door transportation between home and work					
B. Direct transportation without other stops					
C. Short travel time					
D. Freedom to make stops on the way to or from work					
E. Freedom to choose to go at different times on different days					
F. Freedom from having to drive					
G. Prefer travelling with other people					
H. Prefer to have travel arrangements handled by someone else					
I. Total transportation expenses must be kept to a minimum					
J. Wish to have vehicle readily available					
K. Wish to be free of responsibility for vehicle maintenance and operation					
L. Need space to carry packages					
M. Freedom from having to obtain parking space					
N. Need transportation to and from work in off-hours (non rush-hour)					
O. Must accommodate my physical disability					
P. Prefer travelling alone					
Q. Other? ______________ ______________					

10. Go back over the above list, and rate your top three preferred characteristics in travel between home and work. (List the letter of your preferences in the appropriate space.)

Most desired characteristic ____

Second desired characteristic ____

Third desired characteristic ____

III. General Information

11. Sex:

____ male

____ female

12. Age group:

____ 15-18

____ 19-24

____ 25-44

____ 45-64

____ 65 or over

13. Please indicate your job classification.

____

14. Usual hours of work:

Start ________________

End ________________

15. Your home postal code ____________________

16. Total number of persons in household who are:

____ Under 12 years of age
____ 12-18 years of age
____ over 18 years

17. How many persons in your household have full-time paid employment?

____

18. Number of automobiles (or trucks) owned and used by family.

____

19. Please indicate your gross family income range?

____ $ 0 - 8,000
____ 8,001 - 16,000
____ 16,001 - 24,000
____ 24,001 - 32,000
____ 32,001 - 40,000
____ 40,001 - 48,000
____ 48,001 - 56,000
____ 56,001+

APPENDIX B Questionnaire Responses

```
                      INKSTER PARK
                      ------------

       FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
   PRIVATE AUTO - ONLY OCCUPANT TRIPS Q1-A

 0        122          122        36.4        36.4
 1          1          123         0.2        36.7
 2          8          131         2.3        39.1
 3          2          133         0.5        39.7
 4          8          141         2.3        42.0
 5          9          150         2.6        44.7
 6          9          159         2.6        47.4
 7          1          160         0.2        47.7
 8         10          170         2.9        50.7
 9          4          174         1.1        51.9
10        131          305        39.1        91.0
11          1          306         0.2        91.3
12         14          320         4.1        95.5
14          8          328         2.3        97.9
16          1          329         0.2        98.2
18          2          331         0.5        98.8
20          3          334         0.8        99.7
28          1          335         0.2       100.0

    AUTO DRIVER WITH PASSENGER TRIPS Q1-B

 0        266          266        79.6        79.6
 1          3          269         0.8        80.5
 2          8          277         2.3        82.9
 3          1          278         0.2        83.2
 4          4          282         1.1        84.4
 5         10          292         2.9        87.4
 6          6          298         1.7        89.2
 8          2          300         0.5        89.8
10         32          332         9.5        99.4
12          1          333         0.2        99.7
18          1          334         0.2       100.0

              AUTO PASSENGER TRIPS Q1-C

 0        276          276        82.8        82.8
 1          3          279         0.9        83.7
 2          3          282         0.9        84.6
 4          3          285         0.9        85.5
 5          5          290         1.5        87.0
 6          3          293         0.9        87.9
 8          3          296         0.9        88.8
 9          3          299         0.9        89.7
10         33          332         9.9        99.7
12          1          333         0.3       100.0

                    TAXI TRIPS Q1-D

 0        331          331        99.1        99.1
 1          2          333         0.5        99.7
10          1          334         0.2       100.0
```

```
            FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT
                      BUS TRIPS Q1-E

 0          298          298         89.2         89.2
 1            2          300          0.5         89.8
 2            3          303          0.8         90.7
 3            1          304          0.2         91.0
 4            1          305          0.2         91.3
 5            2          307          0.5         91.9
 6            1          308          0.2         92.2
 7            2          310          0.5         92.8
 8            1          311          0.2         93.1
 9            1          312          0.2         93.4
10           19          331          5.6         99.1
12            2          333          0.5         99.7
14            1          334          0.2        100.0

                    WALKING TRIPS Q1-F

 0          313          313         93.7         93.7
 1            5          318          1.4         95.2
 2            2          320          0.5         95.8
 4            1          321          0.2         96.1
 5            2          323          0.5         96.7
 7            1          324          0.2         97.0
 8            1          325          0.2         97.3
10            7          332          2.0         99.4
12            2          334          0.5        100.0

                      OTHER TRIPS Q1-G

 0          332          332         99.4         99.4
 2            1          333          0.2         99.7
 4            1          334          0.2        100.0

         ADULT PASSENGERS ON WAY TO WORK Q2-A1

 0          275          275         84.0         84.0
 1           17          292          5.1         89.2
 2            3          295          0.9         90.2
 3            5          300          1.5         91.7
 4            2          302          0.6         92.3
 5           25          327          7.6        100.0

            ADULT PASSENGERS AT LUNCH Q2-A2

 0          319          319         97.5         97.5
 1            5          324          1.5         99.0
 2            2          326          0.6         99.6
 4            1          327          0.3        100.0
```

```
        FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT
      ADULT PASSENGERS ON WAY HOME Q2-A3

0         251          251        76.7        76.7
1          24          275         7.3        84.0
2          13          288         3.9        88.0
3           5          293         1.5        89.6
4           3          296         0.9        90.5
5          31          327         9.4       100.0

    CHILD PASSENGERS ON WAY TO WORK Q2-B1

0         296          296        90.5        90.5
1           8          304         2.4        92.9
2           1          305         0.3        93.2
3           2          307         0.6        93.8
5          20          327         6.1       100.0

        CHILD PASSENGERS AT LUNCH Q2-B2

0         325          325        99.3        99.3
2           1          326         0.3        99.6
5           1          327         0.3       100.0

      CHILD PASSENGERS ON WAY HOME Q2-B3

0         293          293        89.6        89.6
1           7          300         2.1        91.7
2           3          303         0.9        92.6
3           5          308         1.5        94.1
5          19          327         5.8       100.0

PICK UP/DROP OFF PACKAGES ON WAY TO WORK Q2-C1

0         318          318        97.2        97.2
1           5          323         1.5        98.7
2           2          325         0.6        99.3
3           2          327         0.6       100.0

PICK UP/DROP OFF PACKAGES AT LUNCH Q2-C2

0         318          318        97.2        97.2
1           4          322         1.2        98.4
2           1          323         0.3        98.7
3           2          325         0.6        99.3
4           1          326         0.3        99.6
5           1          327         0.3       100.0
```

```
          FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
PICK UP/DROP OFF PACKAGES ON WAY HOME Q2-C3

0           279          279      85.3        85.3
1            20          299       6.1        91.4
2            16          315       4.8        96.3
3             8          323       2.4        98.7
4             2          325       0.6        99.3
5             2          327       0.6       100.0

GO TO ANOTHER DESTINATION ON WAY TO WORK Q2-D1

0           298          298      91.1        91.1
1             9          307       2.7        93.8
2             8          315       2.4        96.3
3             5          320       1.5        97.8
4             2          322       0.6        98.4
5             5          327       1.5       100.0

GO TO ANOTHER DESTINATION AT LUNCH Q2-D2

0           300          300      91.7        91.7
1            13          313       3.9        95.7
2             8          321       2.4        98.1
3             1          322       0.3        98.4
4             1          323       0.3        98.7
5             4          327       1.2       100.0

 GO TO ANOTHER DESTINATION ON WAY HOME Q2-D3

0           218          218      66.6        66.6
1            31          249       9.4        76.1
2            36          285      11.0        87.1
3            20          305       6.1        93.2
4             8          313       2.4        95.7
5            14          327       4.2       100.0

 ATTEND TO PERS BUSINESS ON WAY TO WORK Q2-E1

0           299          299      91.4        91.4
1            13          312       3.9        95.4
2             5          317       1.5        96.9
3             5          322       1.5        98.4
4             1          323       0.3        98.7
5             4          327       1.2       100.0

 ATTEND TO PERS BUSINESS AT LUNCH Q2-E2

0           295          295      90.2        90.2
1            18          313       5.5        95.7
2            11          324       3.3        99.0
3             2          326       0.6        99.6
5             1          327       0.3       100.0
```

```
                                  FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                                 ATTEND TO PERS BUSINESS ON WAY HOME Q2-E3

                              0        208        208      63.6        63.6
                              1         38        246      11.6        75.2
                              2         34        280      10.3        85.6
                              3         29        309       8.8        94.4
                              4          8        317       2.4        96.9
                              5         10        327       3.0       100.0

                                 REASONS FOR PRESENT TRANPORTATION Q3

CONVENIENT                              59         59      18.3        18.3
FLEXIBLE                                24         83       7.4        25.6
POOR/NO BUS SERVICE                    107        190      33.3        59.1
TIME OF TRIP                            76        266      23.6        82.8
SHARING RIDE                             4        270       1.2        84.1
UNABLE TO DRIVE                         30        300       9.3        93.4
COST                                    10        310       3.1        96.5
OTHER REASON                            11        321       3.4       100.0

                               DID EASE OF TRANS AFFECT WORK DECISION Q4-A

YES                                     83         83      24.6        24.6
NO                                     254        337      75.3       100.0

                               WAS EASE OF TRANS A MAJOR WORK FACTOR Q4-B

YES                                     59         59      17.5        17.5
NO                                     278        337      82.4       100.0

                                CONVENIENCE OF PARKING TO WORK Q5-A

    CONVENIENT                         169        169      66.5        66.5
             2                          28        197      11.0        77.5
             3                          32        229      12.5        90.1
             4                          11        240       4.3        94.4
    INCONVENIENT                        14        254       5.5       100.0


                               CONVENIENCE OF BUS STOP TO HOME Q5-B1

    CONVENIENT                          90         90      30.5        30.5
             2                          47        137      15.9        46.4
             3                          43        180      14.5        61.0
             4                          18        198       6.1        67.1
    INCONVENIENT                        97        295      32.8       100.0
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                    FREQUENCY [illegible]

                    CONVENIENCE OF BUS STOP TO WORK [illegible]
CONVENIENT             76          76        25.7        25.7
    2                  42         118        14.2        39.9
    3                  39         157        13.2        53.0
    4                  21         178         7.1        60.1
INCONVENIENT          118         296        39.9       100.0

                    ESTIMATED WEEKLY PRIVATE AUTO COSTS [illegible]
           0           69          69        21.3        21.3
BETWEEN    0 AND 5      4          73         1.2        22.5
           5            8          81         2.5        25.0
BETWEEN    5 AND 10    17          98         5.2        30.2
          10           37         136        11.4        [illegible]
BETWEEN   10 AND 15    15         [illegible] 4.6        [illegible]
          15           18         172         5.5        [illegible]
BETWEEN   15 AND 20    13         185         [illegible] [illegible]
          20           42         227        12.9        [illegible]
BETWEEN   20 AND 25     7         234         2.2        72.[illegible]
          25           35         270        10.8        [illegible]
BETWEEN   25 AND 30     5         275         1.5        [illegible]
          30           27         302         8.3        [illegible]
OVER 30                22         324         7.1       100.0

                    ESTIMATED WEEKLY TRANSIT COSTS [illegible]
           0          285         285        88.0        88.0
BETWEEN    0 AND 5     11         296         3.3        91.4
           5           16         312         4.9        96.3
BETWEEN    5 AND 10     7         319         2.1        98.5
          10            1         320         0.3        98.8
OVER 10                 4         324         1.2       100.0

                    ESTIMATED WEEKLY SHARED AUTO COSTS [illegible]
           0          285         285        88.0        88.0
BETWEEN    0 AND 5     11         296         3.4        91.5
           5           16         312         4.9        96.3
BETWEEN    5 AND 10     7         319         2.2        98.5
10 AND OVER             5         324         1.6       100.0

                    MINUTES TO WORK Q7-A
     1 TO 15          179         179        52.6        52.6
    16 TO 30          117         296        34.4        87.1
    31 TO 45           29         325         8.5        95.6
    46 TO 60           11         336         3.2        98.8
    OVER 60             4         340         1.1       100.0

                    MINUTES FROM WORK Q7-B
     1 TO 15          162         162        47.7        47.7
    16 TO 30          125         287        36.8        84.6
    31 TO 45           34         321        10.0        94.6
    46 TO 60           12         333         3.5        98.2
    OVER 60             6         339         1.7       100.0
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                          FREQUENCY  CUM FREQ   PERCENT   CUM PERCENT
                        FIRST DISLIKE ABOUT TRAVEL MODE Q8-A
TRAVEL TIME                  14          14        4.4         4.4
WINTER DRIVING               31          45        9.8        14.3
HEAVY TRAFFIC                36          81       11.4        25.7
COST OF GAS                  19         100        6.0        31.8
NO DISLIKE                  120         220       38.2        70.0
CROWDED BUS                   5         225        1.5        71.6
POOR BUS SERVICE             12         237        3.8        75.4
PARKING                       7         244        2.2        77.7
CO-TRAVELERS                 14         258        4.4        82.1
EXPENSE                      16         274        5.0        87.2
CAR MAINTENANCE               6         280        1.9        89.1
OTHER                        22         302        7.0        96.1
WEATHER                      12         314        3.8       100.0

                       SECOND DISLIKE ABOUT TRAVEL MODE Q8-B
TRAVEL TIME                  16          16        9.3         9.3
WINTER DRIVING               12          28        6.9        16.2
HEAVY TRAFFIC                15          43        8.7        25.0
COST OF GAS                   5          48        2.9        27.9
NO DISLIKE                   78         126       45.3        73.2
CROWDED BUS                   3         129        1.7        75.0
POOR BUS SERVICE              7         136        4.0        79.0
PARKING                       6         142        3.4        82.5
CO-TRAVELERS                  5         147        2.9        85.4
EXPENSE                       7         154        4.0        89.5
CAR MAINTENANCE               4         158        2.3        91.8
OTHER                        10         168        5.8        97.6
WEATHER                       4         172        2.3       100.0

                        THIRD DISLIKE ABOUT TRAVEL MODE Q8-C
TRAVEL TIME                   1           1        0.8         0.8
WINTER DRIVING                1           2        0.8         1.6
HEAVY TRAFFIC                10          12        8.3        10.0
COST OF GAS                   2          14        1.6        11.6
NO DISLIKE                   76          90       63.3        75.0
CROWDED BUS                   2          92        1.6        76.6
POOR BUS SERVICE              2          94        1.6        78.3
PARKING                       3          97        2.5        80.8
CO-TRAVELERS                  2          99        1.6        82.5
CAR MAINTENANCE               5         104        4.1        86.6
OTHER                        12         116       10.0        96.6
WEATHER                       4         120        3.3       100.0
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                          FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                             DOOR TO DOOR TRANPORT Q9-A

IMPORTANT                    227        227       68.7       66.7
                2             39        266       11.8       80.6
                3             32        298        9.6       90.3
                4             10        308        3.0       93.3
NOT IMPORTANT                 22        330        6.6      100.0

                         DIRECT TRANSPORT WITHOUT STOPS Q9-B

IMPORTANT                    187        187       58.2       58.2
                2             47        234       14.6       72.8
                3             37        271       11.5       84.4
                4             21        292        6.5       90.9
NOT IMPORTANT                 29        321        9.0      100.0

                               SHORT TRAVEL TIME Q9-C

IMPORTANT                    220        220       67.0       67.0
                2             52        272       15.8       82.9
                3             35        307       10.6       93.5
                4              5        312        1.5       95.1
NOT IMPORTANT                 16        328        4.8      100.0

                             FREEDOM TO MAKE STOPS Q9-D

IMPORTANT                    131        131       40.8       40.8
                2             50        181       15.5       56.3
                3             53        234       16.5       72.8
                4             20        254        6.2       79.1
NOT IMPORTANT                 67        321       20.8      100.0

                        ABLE TO CHOOSE DIFFERENT TRAVEL TIMES Q9-E

IMPORTANT                    118        118       36.7       36.7
                2             52        170       16.1       52.9
                3             52        222       16.1       69.1
                4             29        251        9.0       78.1
NOT IMPORTANT                 70        321       21.8      100.0

                             FREEDOM FROM DRIVING Q9-F

IMPORTANT                     58         58       18.1       18.1
                2             27         85        8.4       26.5
                3             46        131       14.3       40.9
                4             26        157        8.1       49.0
NOT IMPORTANT                163        320       50.9      100.0
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                        FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                          TRAVEL WITH OTHERS Q9-G
IMPORTANT                   29         29        9.0         9.0
            2               24         53        7.4        16.4
            3               87        140       27.0        43.4
            4               33        173       10.2        53.7
NOT IMPORTANT              149        322       46.2       100.0

                     FREEDOM FROM MAKING ARRANGEMENTS Q9-H
IMPORTANT                   19         19        6.0         6.0
            2               10         29        3.1         9.1
            3               34         68       12.3        21.5
            4               28         96        8.8        30.3
NOT IMPORTANT              220        316       69.6       100.0

                         EXPENSES KEPT TO MINIMUM Q9-I
IMPORTANT                  151        151       46.6        46.6
            2               50        201       15.4        62.0
            3               63        264       19.4        81.4
            4               14        278        4.3        85.8
NOT IMPORTANT               46        324       14.1       100.0

                        VEHICLE READILY AVAILABLE Q9-J
IMPORTANT                  218        218       68.1        68.1
            2               39        257       12.1        80.3
            3               28        285        8.7        89.0
            4                7        292        2.1        91.2
NOT IMPORTANT               28        320        8.7       100.0

                    NO RESPONSIBILITY FOR MAINT/OPERS Q9-K
IMPORTANT                   81         81       25.7        25.7
            2               26        108        8.3        34.0
            3               78        186       24.7        58.8
            4               37        223       11.7        70.5
NOT IMPORTANT               93        316       29.6       100.0

                         SPACE TO CARRY PACKAGES Q9-L
IMPORTANT                   37         38       12.0        12.0
            2               29         67        9.4        21.4
            3               68        135       22.0        43.4
            4               24        159        7.8        51.3
NOT IMPORTANT              151        310       48.8       100.0
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                    FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                          NO PARKING PROBLEMS Q9-M

IMPORTANT               86        87        27.3        27.3
                2       35       122        11.1        38.4
                3       50       172        15.9        54.3
                4       31       203         9.9        64.3
NOT IMPORTANT          113       316        35.8       100.0

                NON RUSH HOUR TRANSPORT AVAILABLE Q9-N

IMPORTANT              139       140        44.0        44.0
                2       36       176        11.5        55.7
                3       45       221        14.3        70.0
                4       16       237         5.1        75.1
NOT IMPORTANT           79       316        25.1       100.0

               MUST ACCOMMODATE PHYSICAL DISABILITY Q9-O

IMPORTANT               24        25         8.3         8.3
                2       10        35         3.5        11.8
                3       13        48         4.5        16.3
                4        7        55         2.4        18.7
NOT IMPORTANT          239       294        81.3       100.0

                          TRAVEL ALONE Q9-P

IMPORTANT               46        47        14.9        14.9
                2       28        75         9.0        23.9
                3       71       146        22.8        46.7
                4       22       168         7.1        53.8
NOT IMPORTANT          144       312        46.2       100.0

                        OTHER RESPONSE Q9-Q

IMPORTANT               16        16        66.7        66.7
                2        1        17         4.2        70.9
NOT IMPORTANT            7        24        29.1       100.0
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                          FREQUENCY   CUM FREQ    PERCENT    CUM PERCENT

                          MOST DESIRED CHARACTERISTIC (10-2)

DOOR TO DOOR                  102         102        33.0         33.0
DIRECT TRANS                   34         136        11.0         44.0
SHORT TRAV TIME                53         189        17.1         61.1
CAN MAKE STOPS                 17         206         5.5         66.6
CAN CHOOSE TIME                22         228         7.1         73.7
NO NEED TO DRIVE                5         233         1.6         75.4
OTHER PEOPLE                    3         236         0.9         76.3
NO ARRANGE ENTS                 1         237         0.3         76.6
LO EXPENSES                    19         256         6.1         82.8
HAVE CAR AVAIL                 27         283         8.7         91.5
NO PARKING PROB                 3         286         0.9         92.5
OFF-HOUR TRANS                  9         295         2.9         95.4
PHYS DISABILITY                 2         297         0.6         96.1
TRAVEL ALONE                    7         304         2.2         98.3
OTHER                           5         309         1.6        100.0

                          SECOND DESIRED CHARACTERISTIC (10-)

DOOR TO DOOR                   36          36        11.8         11.8
DIRECT TRANS                   52          88        17.1         28.9
SHORT TRAV TIME                51         139        16.7         45.7
CAN MAKE STOPS                 28         167         9.2         54.9
CAN CHOOSE TIME                21         188         6.9         61.8
NO NEED TO DRIVE                7         195         2.3         64.1
OTHER PEOPLE                    2         197         0.6         64.8
NO ARRANGE ENTS                 3         200         0.9         65.7
LO EXPENSES                    30         230         9.8         75.6
HAVE CAR AVAIL                 36         266        11.8         87.5
NO DRV/MAINT RESP               9         275         2.9         90.4
NO PARKING PROB                 8         283         2.6         93.0
OFF-HOUR TRANS                 12         295         3.9         97.0
PHYS DISABILITY                 2         297         0.6         97.6
TRAVEL ALONE                    4         301         1.3         99.0
OTHER                           3         304         0.9        100.0

                          THIRD DESIRED CHARACTERISTIC (10-P

DOOR TO DOOR                   30          30        10.0         10.0
DIRECT TRANS                   17          47         5.7         15.7
SHORT TRAV TIME                58         105        19.4         35.2
CAN MAKE STOPS                 29         134         9.7         44.9
CAN CHOOSE TIME                21         155         7.0         52.0
NO NEED TO DRIVE                8         163         2.6         54.6
OTHER PEOPLE                    7         170         2.3         57.0
NO ARRANGE ENTS                 2         172         0.6         57.7
LO EXPENSES                    27         199         9.0         66.7
HAVE CAR AVAIL                 37         236        12.4         79.1
NO DRV/MAINT RESP              11         247         3.6         82.8
LUGGAGE SPACE                   2         249         0.6         83.5
NO PARKING PROB                 9         258         3.0         86.5
OFF-HOUR TRANS                 26         284         8.7         95.3
PHYS DISABILITY                 2         286         0.6         95.9
TRAVEL ALONE                    6         292         2.0         97.9
OTHER                           6         298         2.0        100.0
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                          FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                               SEX OF RESPONDENT Q11

               MALE          133        133       39.1        39.1
               FEMALE        207        340       60.8       100.0

                               AGE OF RESPONDENT Q12

           15 TO 18           10         10        2.9         2.9
           19 TO 24          119        129       35.3        38.2
           25 TO 44          174        303       51.6        89.9
           45 TO 64           34        337       10.0       100.0

                        JOB CLASSIFICATION OF RESPONDENT Q13

                  1          180        180       59.2        59.2
                  2           61        241       20.0        79.2
                  3           26        267        8.5        87.6
                  4           37        304       12.1       100.0

                              WORK STARTING TIME Q14-A

      BEFORE 700               4          4        1.1         1.1
             700             138        142       41.1        42.3
             730              13        155        3.8        46.2
             800             151        306       45.0        91.3
             830              11        317        3.2        94.6
             900               6        323        1.7        96.4
            1500               3        326        0.8        97.3
            1530               1        327        0.2        97.6
            1550               1        328        0.2        97.9
            1600               1        329        0.2        98.2
            1630               2        331        0.5        98.8
            1800               3        334        0.8        99.7
            2400               1        335        0.2       100.0

                              WORK FINISH TIME Q14-B

     BEFORE 1500               4          4        1.1         1.1
            1500               6         10        1.7         2.9
    1500 TO 1530              73         83       21.7        24.7
            1530              56        139       16.7        41.4
    1531 TO 1559               1        140        0.2        41.7
            1600              45        185       13.4        55.2
            1630             115        300       34.3        89.5
            1700              18        318        5.3        94.9
            1730               2        320        0.5        95.5
            1800               1        321        0.2        95.8
            1830               1        322        0.2        96.1
            2300               2        324        0.5        96.7
            2330               4        328        1.1        97.9
            2400               7        335        2.0       100.0
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          FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT
                    WORK SHIFT Q14-C

0           245          245        72.4         72.4
1            93          338        27.5        100.0

          HOUSEHOLD MEMBERS BELOW 12 Q16-A

0           227          227        67.7         67.7
1            56          263        16.7         84.4
2            41          324        12.2         96.7
3            10          334         2.9         99.7
4             1          335         0.2        100.0

   HOUSEHOLD MEMBERS FROM 12 TO 18 Q16-B

0           266          266        79.4         79.4
1            39          305        11.6         91.0
2            20          325         5.9         97.0
3             7          332         2.0         99.1
4             3          335         0.8        100.0

          HOUSEHOLD MEMBERS OVER 16 Q16-C

0            11           11         3.2          3.2
1            87           98        25.8         29.1
2           151          249        44.9         74.1
3            55          304        16.3         90.4
4            27          331         8.0         98.5
5             3          334         0.8         99.4
6             2          336         0.5        100.0

   NUMBER OF INCOME EARNERS AT HOME Q17

0             6            6         1.7          1.7
1           116          122        34.5         36.3
2           155          277        46.1         82.4
3            41          318        12.2         94.6
4            16          334         4.7         99.4
5             2          336         0.5        100.0
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                   FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                 NUMBER OF AUTOS OWNED BY FAMILY Q18
                0         25         25       7.4        7.4
                1        158        163      47.1       54.6
                2        117        300      34.9       89.5
                3         20        320       5.9       95.5
                4          7        327       2.0       97.6
                5          6        333       1.7       99.4
                6          1        334       0.2       99.7
                7          1        335       0.2      100.0

0 TO 8000                 11         11       3.5        3.5
8001 TO 16000             70         81      22.7       26.2
16001 TO 24000            87        168      28.2       54.5
24001 TO 32000            65        233      21.1       75.6
32001 TO 40000            28        261       9.0       84.7
40001 TO 48000            20        281       6.4       91.2
48001 TO 56000            10        291       3.2       94.4
OVER 56000                17        308       5.5      100.0

                       RESIDENT TRAFFIC ZONE
               47          1          1       0.2        0.2
               67          4          5       1.1        1.4
               68          1          6       0.2        1.7
              120          2          8       0.5        2.3
              121          7         15       2.0        4.3
              130          2         17       0.5        4.9
              140          1         18       0.2        5.2
              141          1         19       0.2        5.5
              142          1         20       0.2        5.8
              143          7         27       2.0        7.8
              150          1         28       0.2        8.1
              151          6         34       1.7        9.9
              152          6         40       1.7       11.6
              160          1         41       0.2       11.9
              170          1         42       0.2       12.2
              230          1         43       0.2       12.5
              270          6         49       1.7       14.2
              320          1         50       0.2       14.5
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FREQUENCY CUM FREQ PERCENT CUM PERCENT

RESIDENT TRAFFIC ZONE

343	1	51	0.3	14.9
348	1	52	0.3	15.2
351	6	58	1.7	16.9
370	2	60	0.6	17.5
371	1	61	0.3	17.8
410	5	66	1.5	19.2
430	2	68	0.6	19.8
431	1	69	0.3	20.1
432	1	70	0.3	20.4
460	1	71	0.3	20.7
470	1	72	0.3	21.0
471	1	73	0.3	21.3
480	1	74	0.3	21.6
490	1	75	0.3	21.9
540	1	76	0.3	22.2
541	1	77	0.3	22.4
542	1	78	0.3	22.7
550	1	79	0.3	23.0
571	1	80	0.3	23.3
581	3	83	0.9	24.2
610	3	86	0.9	25.1
620	8	94	2.3	27.4
621	6	100	1.7	29.2
630	1	101	0.3	29.4
631	2	103	0.6	30.0
640	2	105	0.6	30.6
641	1	106	0.3	30.9
650	4	110	1.1	32.1
661	1	111	0.3	32.4
670	8	119	2.3	34.7
680	6	125	1.7	36.4
690	1	126	0.3	36.7
720	3	129	0.9	37.6
721	3	132	0.9	38.5
730	2	134	0.6	39.1
731	4	138	1.1	40.2
732	3	141	0.9	41.1
741	4	145	1.1	42.3
750	13	158	3.7	46.1
820	7	165	2.0	48.1
830	7	172	2.0	50.1
831	7	179	2.0	52.2
832	7	186	2.0	54.2
833	9	195	2.6	56.9
840	2	197	0.6	57.4
841	9	206	2.6	60.1
842	3	209	0.9	60.9
843	11	220	3.2	64.1
844	10	230	2.9	67.1
850	4	234	1.1	68.2
851	1	235	0.3	68.5
852	38	273	11.0	79.6
853	6	279	1.7	81.3
940	64	343	18.7	100.0

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                   - GREAT WEST LIFE
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     FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
 [illegible] AUTO - ONLY PERSONAL TRIPS [illegible]

  0         712        712       61.2       61.2
  1          13        725        1.1       62.3
  2          60        785        5.1       67.5
  3           4        789        0.3       67.9
  4          31        820        2.6       70.5
  5          11        831        0.9       71.5
  6          36        867        3.0       74.6
  7           4        871        0.3       74.9
  8          27        898        2.3       77.2
  9          12        910        1.0       78.3
 10         216       1126       18.5       96.9
 12          18       1144        1.5       98.4
 14          11       1155        0.9       99.3
 15           1       1156        0.0       99.4
 16           2       1158        0.1       99.6
 20           3       1161        0.2       99.9
 26           1       1162        0.0      100.0

 AUTO DRIVER WITH PASSENGER TRIPS [illegible]

  0         976        976       83.9       83.9
  1          14        990        1.2       85.1
  2          22       1012        1.8       87.0
  3           8       1020        0.6       87.7
  4          18       1038        1.5       89.3
  5          15       1053        1.2       90.6
  6           8       1061        0.6       91.3
  7           1       1062        0.0       91.3
  8          12       1074        1.0       92.4
  9           6       1080        0.5       92.9
 10          77       1157        6.6       99.5
 12           3       1160        0.2       99.8
 13           1       1161        0.0       99.9
 15           1       1162        0.0      100.0
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FREQUENCY [illegible]
AUTO PASSENGERS [illegible]
  0     [illegible]   [illegible]   17.[illegible]   [illegible]
  1     43            6[illegible]1  3.7             [illegible]
  2     45            [illegible]    3.[illegible]   [illegible]
  3     14            [illegible]    1.2             [illegible]
  4     26            [illegible]    2.2             [illegible]
  5     [illegible]   [illegible]    [illegible]     [illegible]
  6     1[illegible]  10[illegible]  1.3             [illegible]
  7     [illegible]   1070           0.[illegible]   [illegible]
  8     11            1081           0.9             [illegible]
  9     14            1095           1.2             [illegible]
 10     62            1157           5.3             [illegible]
 12     2             1159           0.1             [illegible]
 14     1             1160           0.0             [illegible]
 15     [illegible]   1162           0.1             100.[illegible]

TAXI TRIPS [illegible]
  0     1157          1157           99.7            [illegible]
  1     2             1159           0.2             [illegible]
  2     [illegible]   1160           0.[illegible]   [illegible]
  4     1             1161           0.[illegible]   [illegible]
 10     1             1162           0.0             100.[illegible]

BUS TRIPS [illegible]
  0     585           585            50.3            50.3
  1     25            610            2.1             52.5
  2     28            638            2.4             54.9
  3     14            652            1.2             56.1
  4     35            687            3.0             59.1
  5     65            752            5.6             64.7
  6     34            786            2.9             67.6
  7     13            801            1.1             68.9
  8     41            842            3.5             72.4
  9     32            872            2.7             75.2
 10     264           1143           23.1            98.3
 11     1             1148           0.0             98.[illegible]
 12     0             1152           0.6             99.[illegible]
 13     1             1153           0.0             99.[illegible]
 14     5             1158           0.4             99.[illegible]
 16     1             1159           0.1             99.7
 20     3             1162           0.2             100.0
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         FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT
              WALKING TRIPS Q1-F
  0        1053         1053       90.6        90.6
  1           8         1061        0.6        91.3
  2          12         1073        1.0        92.3
  3           1         1074        0.0        92.4
  4           7         1081        0.6        93.0
  5           4         1085        0.3        93.3
  6           8         1093        0.6        94.0
  7           1         1094        0.0        94.1
  8           4         1098        0.3        94.4
  9           5         1103        0.4        94.9
 10          50         1153        4.3        99.2
 11           1         1154        0.0        99.3
 12           4         1158        0.3        99.6
 14           1         1159        0.0        99.7
 16           1         1160        0.0        99.8
 17           1         1161        0.0        99.9
 20           1         1162        0.0       100.0

              OTHER TRIPS Q1-G
  0        1155         1155       99.3        99.3
  1           1         1156        0.0        99.4
  4           1         1157        0.0        99.5
  5           2         1159        0.1        99.7
  6           1         1160        0.0        99.8
 10           2         1162        0.1       100.0

   ADULT PASSENGERS ON WAY TO LUNCH Q2-A1
  0        1006         1006       86.6        86.6
  1          35         1041        3.0        89.6
  2          19         1060        1.6        91.3
  3           8         1068        0.6        91.9
  4           6         1074        0.5        92.5
  5          87         1161        7.4       100.0

      ADULT PASSENGERS AT LUNCH Q2-A2
  0        1148         1148       98.7        98.7
  1           5         1153        0.4        99.2
  2           7         1160        0.6        99.8
  3           2         1162        0.1       100.0
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           FREQUENCY    CUM FREQ    PERCENT    CUM PERCENT

         ADULT PASSENGERS ON WAY TO WORK (2-A3)

             969          969         83.3        83.3
     1        66         1035          5.6        89.0
     2        32         1067          2.7        91.8
     3        12         1079          1.0        92.8
     4         9         1088          0.7        93.6
     5        73         1161          6.2        99.9
     6         1         1162          0.0       100.0

        CHILD PASSENGERS ON WAY TO WORK (2-B1)

     0      1074         1074         92.4        92.4
     1        16         1090          1.3        93.8
     2         6         1096          0.5        94.3
     3        12         1108          1.0        95.3
     4         3         1111          0.2        95.6
     5        51         1162          4.3       100.0

           CHILD PASSENGERS AT LUNCH (2-B2)

     0      1157         1157         99.5        99.5
     1         4         1161          0.3        99.9
     2         1         1162          0.0       100.0

         CHILD PASSENGERS ON WAY FROM WORK (2-B3)

     0      1079         1079         92.8        92.8
     1        11         1090          0.9        93.8
     2         6         1096          0.5        94.3
     3         8         1104          0.6        95.0
     4         5         1109          0.4        95.4
     5        53         1162          4.5       100.0

     PICK UP/DROP OFF PACKAGES ON WAY TO WORK (2-C1)

     0      1102         1102         94.8        94.8
     1        44         1146          3.7        98.6
     2        10         1156          0.8        99.4
     3         5         1161          0.4        99.9
     5         1         1162          0.0       100.0
     FREQUENCY  CUM FREQ   PERCENT   CUM PERCENT
PICK UP/DROP OFF PACKAGES AT LUNCH  [illegible]

0        1016         1016         87.4         87.4
1          63         1079          5.4         92.8
2          53         1132          4.5         97.4
3          23         1155          1.9         99.3
4           5         1160          0.4         99.8
5           2         1162          0.1        100.0

PICK UP/DROP OFF PACKAGES ON WAY TO/FR WORK [illegible]

0         896          896         77.1         77.1
1         112         1008          9.6         86.7
2          95         1103          8.1         94.9
3          39         1142          3.3         98.2
4          12         1154          1.0         99.3
5           8         1162          0.6        100.0

GO TO ANOTHER DESTINATION ON WAY TO WORK [illegible]

0        1114         1114         95.8         95.8
1          24         1138          2.0         97.9
2          15         1153          1.2         99.2
3           3         1156          0.2         99.4
4           2         1158          0.1         99.6
5           4         1162          0.3        100.0

GO TO ANOTHER DESTINATION AT LUNCH [illegible]

0         966          966         83.1         83.1
1          86         1052          7.4         90.5
2          59         1111          5.0         95.6
3          25         1136          2.1         97.7
4           8         1144          0.6         98.4
5          18         1162          1.5        100.0
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          FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT

     GO TO ANOTHER DESTINATION ON WAY HOME Q2-5

0           666         666         57.3        57.3
1           166         832         14.3        71.6
2           183        1015         15.7        87.3
3            88        1103          7.6        94.9
4            32        1136          2.7        97.8
5            25        1161          2.1        99.9
6             1        1162          0.1       100.0

     ATTEND TO PERS BUSINESS ON WAY TO WORK Q5-1

0          1112        1112         95.7        95.7
1            32        1144          2.8        98.5
2            10        1154          0.9        99.3
3             3        1157          0.3        99.6
4             1        1158          0.1        99.7
5             4        1162          0.3       100.0

     ATTEND TO PERS BUSINESS AT LUNCH Q5-2

0           875         875         75.3        75.3
1           126        1001         10.8        86.1
2            46        1047          4.0        90.1
3            95        1142          8.2        98.3
4             6        1148          0.5        98.8
5            13        1161          1.1       100.0

     ATTEND TO PERS BUSINESS ON WAY HOME Q5-3

0           640         640
1           200         840         17.2        72.3
2           197        1037         17.0        89.2
3            81        1118          7.0        96.2
4            16        1134          1.4        97.6
5            28        1162          2.4       100.0
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                          FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
                 REASONS FOR PREF[illegible] T[illegible] [illegible]TATIONS

CONVENIENT                  265         265        23.1        23.1
FLEXIBLE                    131         396        11.4        34.6
MONEY/[illegible] BUS SERV  109         505         9.5        44.1
TIME OF TRIP                143         648        12.5        56.6
STARTING TIME                71         719         6.2        62.8
UNABLE TO DRIVE             196         915        17.1        79.9
COST                        204        1119        17.8        97.8
OTHER REASON                 25        1144         2.1       100.0

              [illegible] EASE OF TRANS AFFECT [illegible] DECISION Q4-A

          YES               390         390        33.6        33.6
          NO                770        1160        66.3       100.0

              [illegible] EASE OF TRANS A MAJOR WORK FACTOR Q4-B

          YES               177         177        15.3        15.3
          NO                979        1156        84.6       100.0

              CONVENIENCE OF PARKING IN [illegible] AREA Q5-A

     CONVENIENT             273         273        52.3        52.3
                  2          99         372        19.0        71.4
                  3          76         448        14.5        85.9
                  4          28         476         5.3        91.3
   INCONVENIENT              45         521         8.6       100.0

              CONVENIENCE OF BUS STOP IN HOME AREA Q5-B

     CONVENIENT             491         491        45.0        45.0
                  2         206         697        18.8        63.8
                  3         170         867        15.5        79.4
                  4         100         967         9.1        88.6
   INCONVENIENT             124        1091        11.3       100.0
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                    CONVENIENCE OF BUS STOP TO [illegible]
                           FREQUENCY  CUM FREQ  PERCENT  CUM PERCENT

CONVENIENT 1                  612        612      54.3       54.3
           2                  220        832      19.5       73.8
           3                  125        957      11.0       84.9
           4                   60       1017       5.3       90.2
INCONVENIENT 5                110       1127       9.7      100.0

                    ESTIMATED WEEKLY PRIVATE AUTO COSTS ($)

0                             619        619      55.4       55.4
BETWEEN 1 AND 5                25        644       2.2       57.7
BETWEEN 5 AND 10               31        675       2.7       60.4
                1              94        769       8.4       68.9
BETWEEN 10 AND 15              37        806       3.3       72.2
BETWEEN 15 AND 20              32        838       2.8       75.0
                2             128        966      11.4       86.5
BETWEEN 20 AND 25              29        995       2.5       89.1
BETWEEN 25 AND 30              13       1008       1.1       90.3
                3              37       1045       3.3       93.6
OVER 30                        71       1116       6.3      100.0

                    ESTIMATED WEEKLY TRANSIT COSTS ($)

                0             543        543      47.8       47.8
BETWEEN 0 AND 5               132        675      11.6       59.4
                5             295        970      25.9       85.4
BETWEEN 5 AND 10              162       1132      14.2       99.7
               10               2       1134       0.1       99.9
OVER 10                         1       1135       0.0      100.0

                    ESTIMATED WEEKLY SHARED AUTO COSTS ($)

1 TO 15                      1119       1119      98.6       98.6
16 TO 30                       11       1130       0.9       99.6
31 TO 45                        3       1133       0.2       99.9
46 TO 60                        1       1134       0.0      100.0
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                         FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
                              MINUTES TO WORK (Q7-)

       1 TO 15                 296        296       25.6        25.6
      16 TO 30                 [illegible] 825      45.6        71.4
      31 TO 45                 [illegible] 1100     15.5        [illegible]
      46 TO 60                  52        1152      [illegible] 99.6
      OVER 60                   [illegible] 1158     0.5       100.0

                              MINUTES FROM WORK (Q7-)

       1 TO 15                 [illegible] 208      17.9        17.9
      16 TO 30                 551        750       47.6        [illegible]
      31 TO 45                 263        1022      22.7        [illegible]
      46 TO 60                 115        1137       9.9        98.3
      OVER 60                   20        1157       1.7        100.0

                         FIRST DISLIKE ABOUT TRAVEL MODE (Q-)

TRAVEL TIME                    157         157      13.6        13.6
WAITING TIME                    26         183       2.2        15.8
SAFETY HAZARDS                 133         316      11.5        27.3
COST OF GAS                     19         335       1.6        29.1
SCHEDULE                       301         636      26.2        55.4
CROWDING                       123         759      11.1        65.7
POOR BUS SERVICE                66         826       5.8        71.4
PARKING                         36         862       3.1        75.0
CO-TRAVELERS                    25         887       2.1        77.2
EXPENSE                         75         962       6.5        83.7
CAR MAINTENANCE                 10         972       0.9        84.0
OTHER                           71        1043       6.1        90.2
WEATHER                         98        1141       8.5        98.3
TRANSFERRING BUS                 7        1148       0.6        100.0
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                              FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT
                           SECOND DISLIKE ABOUT TRAVEL MODE USED
TRAVEL TIME                      86          86         11.1        11.1
WINTER DRIVING                   22         108          2.8        14.0
HEAVY TRAFFIC                    45         153          5.8        19.8
COST OF GAS                      10         163          1.3        21.1
NO DISLIKE                      244         407         31.7        52.9
CROWDED BUS                      91         498         11.8        64.7
POOR BUS SERVICE                 68         566          8.8        73.6
PARKING                          14         580          1.8        75.4
CO-TRAVELLERS                    11         591          1.4        76.8
EXPENSE                          32         623          4.1        81.0
LACK OF INDEPENDENCE              8         631          1.0        82.0
OTHER                            79         710         10.2        92.3
WEATHER                          55         765          7.1        99.4
TRANSFERRING BUS                  4         769          0.5       100.0

                           THIRD DISLIKE ABOUT TRAVEL MODE USED
TRAVEL TIME                      46          46          8.5         8.5
WINTER DRIVING                    7          53          1.2         9.7
HEAVY TRAFFIC                    18          71          3.3        13.1
COST OF GAS                       6          77          1.1        14.2
NO DISLIKE                      243         320         44.9        59.1
CROWDED BUS                      40         360          7.3        66.5
POOR BUS SERVICE                 40         400          7.3        73.9
PARKING                          14         414          2.5        76.5
CO-TRAVELLERS                     3         417          0.5        77.0
EXPENSE                          18         435          3.3        80.4
LACK OF INDEPENDENCE              6         441          1.1        81.5
OTHER                            60         501         11.0        92.6
WEATHER                          37         538          6.8        99.4
TRANSFERRING BUS                  3         541          0.5       100.0

                           [illegible] TO WORK TRANSPORT [illegible]
   IMPORTANT                    507         507         44.7        44.7
           2                    281         788         24.8        69.5
           3                    213        1001         18.7        88.3
           4                     61        1062          5.3        93.7
   NOT IMPORTANT                 71        1133          6.2       100.0
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                    FREQUENCY   CUM FREQ    PERCENT   CUM PERCENT

                   DIRECT TRANSPORT WITHOUT STOPS Q9-B

IMPORTANT               447         447        38.8        39.6
            2           285         732        25.1        64.8
            3           221         953        19.2        84.4
            4            84        1037         7.3        91.9
NOT IMPORTANT            92        1129         8.1       100.0

                        SHORT TRAVEL TIME Q9-C

IMPORTANT               654         654        57.5        57.6
            2           303         957        26.6        84.2
            3           132        1089        11.6        95.9
            4            28        1117         2.4        98.3
NOT IMPORTANT            19        1136         1.6       100.0

                      FREEDOM TO MAKE STOPS Q9-D

IMPORTANT               417         417        36.6        36.8
            2           235         652        20.5        57.5
            3           210         862        18.5        76.0
            4           121         983        10.6        86.7
NOT IMPORTANT           151        1134        13.3       100.0

                 ABLE TO CHOOSE DIFFERENT TRAVEL TIMES Q9-E

IMPORTANT               476         476        41.4        41.8
            2           225         701        19.7        61.6
            3           160         861        14.0        75.7
            4            95         956         8.3        84.0
NOT IMPORTANT           182        1138        15.9       100.0

                      FREEDOM FROM DRIVING Q9-F

IMPORTANT               162         162        14.2        14.3
            2           103         265         9.0        23.4
            3           216         481        19.0        42.4
            4           143         624        12.6        55.0
NOT IMPORTANT           510        1134        44.9       100.0
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	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
TRAVEL WITH OTHERS ([illegible])				
IMPORTANT	50	50	4.4	4.4
2	77	127	6.8	11.2
3	249	376	22.1	33.3
4	159	535	14.1	47.4
NOT IMPORTANT	594	1129	52.6	100.0
FREEDOM FROM MAKING ARRANGEMENTS ([illegible])				
IMPORTANT	28	28	2.5	2.5
2	55	83	4.9	7.4
3	148	231	13.1	20.5
4	137	368	12.2	32.7
NOT IMPORTANT	759	1127	67.3	100.0
EXPENSES KEPT TO MINIMUM ([illegible])				
IMPORTANT	415	415	36.2	36.2
2	217	632	19.0	55.2
3	301	933	26.3	81.5
4	97	1030	8.5	90.0
NOT IMPORTANT	115	1145	10.0	100.0
VEHICLE RELIABILITY/COMFORTABLE ([illegible])				
IMPORTANT	456	456	39.6	39.6
2	255	711	22.5	61.8
3	204	915	17.7	79.5
4	76	991	6.6	86.1
NOT IMPORTANT	160	1151	13.9	100.0
NO RESPONSIBILITY FOR [illegible] ([illegible])				
IMPORTANT	177	177	15.3	15.3
2	116	293	10.0	25.4
3	260	553	22.5	47.9
4	189	742	16.4	64.2
NOT IMPORTANT	413	1155	35.8	100.0

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                         FREQUENCY  CUM FREQ   PERCENT  CUM PERCENT
                         SPACE TO CARRY PACKAGES Q4-L
IMPORTANT                   115        115       10.1       10.1
                   2        149        264       13.1       23.2
                   3        275        539       24.2       47.5
                   4        202        741       17.6       65.0
NOT IMPORTANT               398       1139       34.5      100.0

                           NO PARKING PROBLEMS Q4-J
IMPORTANT                   228        228       20.3       20.3
                   2        151        376       13.1       33.4
                   3        274        620       24.4       55.4
                   4        132        752       11.7       67.2
NOT IMPORTANT               367       1119       32.7      100.0

                 NON RUSH HOUR TRANSPORT AVAILABLE Q4-I
IMPORTANT                   246        246       21.8       21.8
                   2        145        391       12.9       34.7
                   3        193        584       17.1       51.9
                   4        132        716       11.7       63.5
NOT IMPORTANT               410       1126       36.4      100.0

                 MUST ACCOMMODATE PHYSICAL DISABILITY Q4-G
IMPORTANT                    27         57        2.5        2.5
                   2         30         57        2.8        5.3
                   3         35         94        3.0        8.8
                   4         14  [illegible]      1.7  [illegible]
NOT IMPORTANT               445       1073       41.7      100.0

                             TRAVEL ALONE Q4-H
IMPORTANT                   112        112       10.0       10.0
                   2         90        202        8.0       18.0
                   3        229        431       20.4       38.4
                   4         94        525        8.3       46.8
NOT IMPORTANT               595       1120       53.1      100.0
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                         FREQUENCY   [illegible]   [illegible]   PERCENT
                              [illegible]

IMPORTANT                 [illegible]   [illegible]   [illegible]   [illegible]
            5             [illegible]   [illegible]   [illegible]   [illegible]
            3             [illegible]   [illegible]   1.6           [illegible]
            [illegible]   [illegible]   [illegible]   1.6           [illegible]
NOT IMPORTANT             1[illegible]  [illegible]   1[illegible].1   [illegible]

                  1ST DESIRED CHARACTERISTIC [illegible]

CLOSE TO WORK             [illegible]   250           [illegible]   [illegible]
DIRECT TRIPS              67            317           [illegible]   [illegible]
SHORT [illegible] TIME    260           577           [illegible].1   [illegible]
[illegible]               [illegible]   [illegible]   7.6           [illegible]
[illegible]               14[illegible] [illegible]   13.0          [illegible]
NO NEED TO DRIVE          [illegible]   [illegible]1  2.8           [illegible]
OTHER PEOPLE              [illegible]   [illegible]7  0.5           [illegible]
[illegible]               12[illegible] [illegible]   11.[illegible]   [illegible]
[illegible]               [illegible]   [illegible]   5.[illegible]   [illegible]
[illegible]               [illegible]   [illegible]   0.5           [illegible]
[illegible]               [illegible]   [illegible]   [illegible]   [illegible]
[illegible]               1[illegible]  1[illegible]7 1.6           [illegible]
[illegible]               2[illegible]  [illegible]   2.2           [illegible]
[illegible]               [illegible]   [illegible]   [illegible].3   [illegible]
[illegible]               1[illegible]  11[illegible] 0.[illegible]   [illegible]
OTHER                     1[illegible]  11[illegible] 1.3           [illegible]
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                         FREQUENCY    CUM FREQ    PERCENT    CUM PERCENT

                   SECOND DESIRED CHARACTERISTIC [illegible]

DOOR TO DOOR              131          131         11.7         11.7
DIRECT TRANS              118          249         10.5         22.2
SHORT TRAV TIME           223          472         19.9         42.1
CAN MAKE STOPS            130          602         11.6         53.7
CAN CHOOSE TIME           141          743         12.6         66.3
NO NEED TO NOTIFY          34          777          3.0         69.4
OTHER PEOPLE                9          786          0.8         70.2
NO ARRANGE [illegible]      2          788          0.1         70.4
LOW EXPENSES              127          915         11.3         81.7
HAVE CAR AVAIL             90         1005          8.0         89.8
NO DRV/AIDE RESP           10         1015          0.8         90.7
LUGGAGE SPACE              10         1025          0.8         91.5
NO PARKING PROB            31         1056          2.7         94.3
OFF-HOUR TRANS             42         1098          3.7         98.1
PHYS DISABILITY             7         1105          0.6         98.7
TRAVEL ALONE                8         1113          0.7         99.4
OTHER                       6         1119          0.5        100.0

                   THIRD DESIRED CHARACTERISTIC [illegible]

DOOR TO DOOR              106          106          9.5          9.5
DIRECT TRANS              105          211          9.4         19.0
SHORT TRAV TIME           160          371         14.4         33.5
CAN MAKE STOPS            111          482         10.0         43.5
CAN CHOOSE TIME           112          594         10.1         53.6
NO NEED TO NOTIFY          41          635          3.7         57.3
OTHER PEOPLE               17          652          1.5         58.8
NO ARRANGE [illegible]      2          654          0.1         59.0
LOW EXPENSES              126          780         11.3         70.4
HAVE CAR AVAIL            124          904         11.2         81.6
NO DRV/AIDE RESP           41          945          3.7         85.3
LUGGAGE SPACE              22          967          1.9         87.3
NO PARKING PROB            51         1018          4.6         91.9
OFF-HOUR TRANS             57         1075          5.1         97.1
PHYS DISABILITY             2         1077          0.1         97.2
TRAVEL ALONE               22         1099          1.9         99.2
OTHER                       8         1107          0.7        100.0

                   SEX OF RESPONDENT Q11

         MALE             353          353         30.5         30.5
         FEMALE           802         1155         69.4        100.0
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                    FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
                       [illegible]
15 TO 19           76          [illegible]   [illegible]   [illegible]
[illegible]        [illegible] [illegible]   [illegible]   [illegible]
[illegible]        [illegible] [illegible]   [illegible]   [illegible]
[illegible]        139         1137          11.6          [illegible]
[illegible]        6           115[illegible] [illegible].1  100.[illegible]

              JOB CLASSIFICATION OF RESPONDENTS
     1             371         371           55.5          55.5
     2             21[illegible] 5[illegible]5  32.1          87.6
     3             [illegible] 6[illegible]0  12.3          100.0

              [illegible] STARTING TIME [illegible]
BEFORE 700
AFTER 700 A.M   730
                 730
AFTER 730 A.M   [illegible]
AFTER 800 A.M   830
AFTER 830 A.M   [illegible]
AFTER 900 A.M   [illegible]
                 [illegible]
                 1000
                 1200
                 1300
                 1400

 FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
 [illegible] 6          0.5       [illegible]
 53          [illegible] [illegible].7  [illegible]
 22          [illegible] [illegible]    [illegible]
 [illegible] 2[illegible]7  17.[illegible]  [illegible]
 61          [illegible] 5.[illegible]  [illegible]
 555         [illegible] [illegible]7.[illegible]  [illegible]
 36          [illegible] 3.1       [illegible]
 136         1[illegible]5  11.[illegible]  [illegible]
 [illegible] 11[illegible]  [illegible].7  [illegible]
 [illegible] 1144       5.1       [illegible]
 2           1146       [illegible].1  [illegible]
 3           1140       [illegible].2  [illegible]
 6           1151       0.1       [illegible]
 1           1152       0.0       [illegible]
 1           1153       0.0       [illegible]
 2           1155       0.1       100.[illegible]
```

```
                         FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
                              WORK FINISH TIME OTHER

BEFORE 1500                  14          14        1.2         1.2
                 1500        39          53        3.3         4.5
[illegible]F 1500 AND 1530   12          65        1.0         5.6
                 1550       160         225       13.8        19.4
1551 TO 1599                 51         276        4.4        23.8
                 1600       551         827       47.7        71.6
1601 TO 1629                 37         864        3.2        74.8
                 1630       109         973        9.4        84.2
1631 TO 1699                 16         989        1.3        85.6
                 1700       114        1103        9.8        95.4
1701 TO 1729                  3        1106        0.2        95.7
                 1730        28        1134        2.4        98.1
                 1745         4        1138        0.3        98.5
                 1800         9        1147        0.7        99.3
                 1850         1        1148        0.0        99.3
                 1900         3        1151        0.2        99.6
                 1950         1        1152        0.0        99.7
                 2000         1        1153        0.0        99.8
                 2200         1        1154        0.0        99.9
                 2400         1        1155        0.0       100.0

                SHIFT    FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT

                    0      1144        1144       99.0        99.0
                    1        11        1155        0.9       100.0

                      HOUSEHOLD MEMBERS BELOW 12 YEARS

                    0       882         882       77.0        77.0
                    1       144        1026       12.5        89.6
                    2        96        1122        8.3        97.9
                    3        20        1142        1.7        99.7
                    4         2        1144        0.1        99.9
                    5         1        1145        0.0       100.0

                   HOUSEHOLD MEMBERS FROM 12 TO 15 YEARS

                    0       961         961       83.9        83.9
                    1       122        1083       10.6        94.5
                    2        54        1137        4.7        99.3
                    3         5        1142        0.4        99.7
                    4         2        1144        0.1        99.9
                    5         1        1145        0.0       100.0
```

```
                  FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
                     # FAMILY MEMBERS OVER 16
            0          31          31        2.7         2.7
            1         266         297       23.2        26.0
            2         608         905       53.2        79.2
            3         145        1050       12.6        91.9
            4          66        1116        5.7        97.7
            5          21        1137        1.8        99.5
            6           5        1142        0.4       100.0

                 NUMBER OF INCOME EARNERS AT HOME Q17
            0          28          28        2.4         2.4
            1         466         494       40.4        42.9
            2         551        1045       47.8        90.7
            3          78        1123        6.7        97.4
            4          23        1146        1.6        99.4
            5           6        1152        0.5       100.0

                 NUMBER OF AUTOS OWNED BY FAMILY Q18
            0         108         108        9.3         9.3
            1         545         653       47.1        56.3
            2         386        1039       33.4        89.4
            3          83        1122        7.1        97.1
            4          22        1144        1.9        99.0
            5           6        1150        0.5        99.6
            6           2        1152        0.1        99.7
            7           1        1153        0.0        99.8
            8           2        1155        0.1       100.0
                  FREQUENCY   CUM FREQ   PERCENT   CUM PERCENT
0000 TO 8000           16          16        1.5         1.5
8001 TO 16000         196         212       19.5        21.1
16001 TO 24000        162         374       16.1        37.3
24001 TO 32000        204         578       20.3        57.5
32001 TO 40000        132         710       13.1        70.6
40001 TO 48000         95         805        9.4        80.1
48001 TO 56000         58         863        5.7        85.9
OVER 56000             78        1001        7.7       100.0
```

RESULTANT TRAFFIC ZONE

	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
21	1	1	0.0	0.0
24	9	10	0.7	0.8
25	5	15	0.4	1.2
46	9	24	0.7	2.0
47	5	29	0.4	2.4
57	3	32	0.2	2.7
58	2	34	0.1	2.9
121	8	42	0.6	3.6
130	6	48	0.5	4.1
140	5	53	0.4	4.5
141	11	64	0.9	5.4
142	6	70	0.5	6.0
143	20	90	1.7	7.7
150	15	105	1.2	9.0
151	27	132	2.3	11.3
152	21	153	1.8	13.1
160	7	160	0.6	13.7
170	4	164	0.3	14.0
210	6	170	0.5	14.5
220	2	172	0.1	14.7
221	3	175	0.2	15.0
230	9	184	0.7	15.7
231	3	187	0.2	16.0
270	42	229	3.6	19.6
271	1	230	0.0	19.7
320	16	246	1.3	21.0
321	8	254	0.6	21.7
330	3	257	0.2	22.0
331	9	266	0.7	22.8
340	23	289	1.9	24.7
341	6	295	0.5	25.3
342	7	302	0.6	25.9
343	7	309	0.6	26.5
348	19	328	1.6	28.1
350	19	347	1.6	29.7
351	24	371	2.0	31.8
370	29	400	2.4	34.3
371	12	412	1.0	35.3
410	25	437	2.1	37.4
420	9	446	0.7	38.2
421	6	452	0.5	38.7
430	13	465	1.1	39.8
431	14	479	1.2	41.0
432	16	495	1.3	42.4
441	11	506	0.9	43.3
442	2	508	0.1	43.5
443	1	509	0.0	43.6
450	13	522	1.1	44.7
451	9	531	0.7	45.5
460	17	548	1.4	46.9
462	5	553	0.4	47.4
470	28	581	2.4	49.8
471	15	596	1.2	51.1
480	7	603	0.6	51.7

```
INTERVAL    FREQUENCY    CUM FREQ    PERCENT    CUM PERCENT
            [illegible]
[illegible]      3       [illegible]   0.2      [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible]   1.1      [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible]      7       [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible]   0.5      [illegible]
[illegible]      7       [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible]     11       [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible]   0.1      [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible]   0.3      [illegible]
[illegible]      1       [illegible] [illegible] [illegible]
    631     [illegible]  [illegible] [illegible] [illegible]
[illegible]     11       [illegible] [illegible] [illegible]
[illegible]      7       [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible]   0.3      [illegible]
[illegible]     13       [illegible]   1.2      [illegible]
[illegible] [illegible]  [illegible]   1.5      [illegible]
[illegible] [illegible]  [illegible]   2.7      [illegible]
[illegible]     11       [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible]      3       [illegible] [illegible] [illegible]
[illegible]      1       [illegible] [illegible] [illegible]
    731          3       [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible] [illegible] [illegible]
[illegible] [illegible]  [illegible]   0.1      [illegible]
[illegible]      1       [illegible]   0.0      [illegible]
[illegible]      3       [illegible]   0.3      [illegible]
    831     [illegible]  [illegible]   0.5        71.1
    832          3       [illegible]   0.3      [illegible]
    833          3       [illegible] [illegible]  71.7
    840          5         911       [illegible] [illegible]
    841          3       [illegible] [illegible] [illegible]
    842          3       [illegible] [illegible] [illegible]
    843         15       [illegible]   1.2      [illegible]
[illegible]     12       [illegible] [illegible]  81.1
[illegible]      2       [illegible]   0.1      [illegible]
    851          2       [illegible]   0.1      [illegible]
    852         23       [illegible]   1.8      [illegible]
    870          1       [illegible] [illegible] [illegible]
    940        142        1106       [illegible]  100.0
```

APPENDIX C Trip Frequency by Mode

Chart C-1

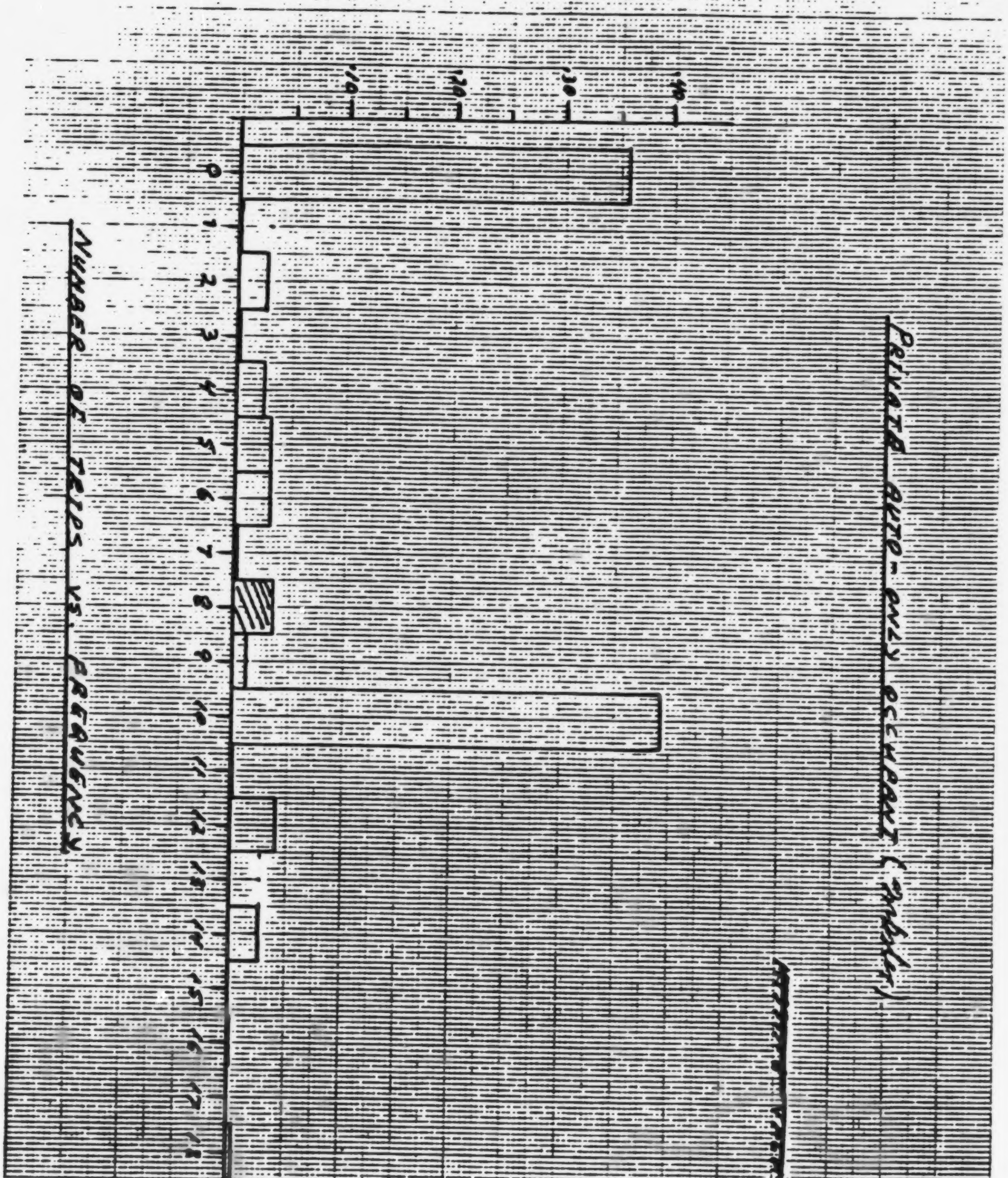

PRIVATE AUTO-ONLY OCCUPANT
NUMBER OF TRIPS VS. FREQUENCY
10
20
30
40
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
METRIC

Chart C-2

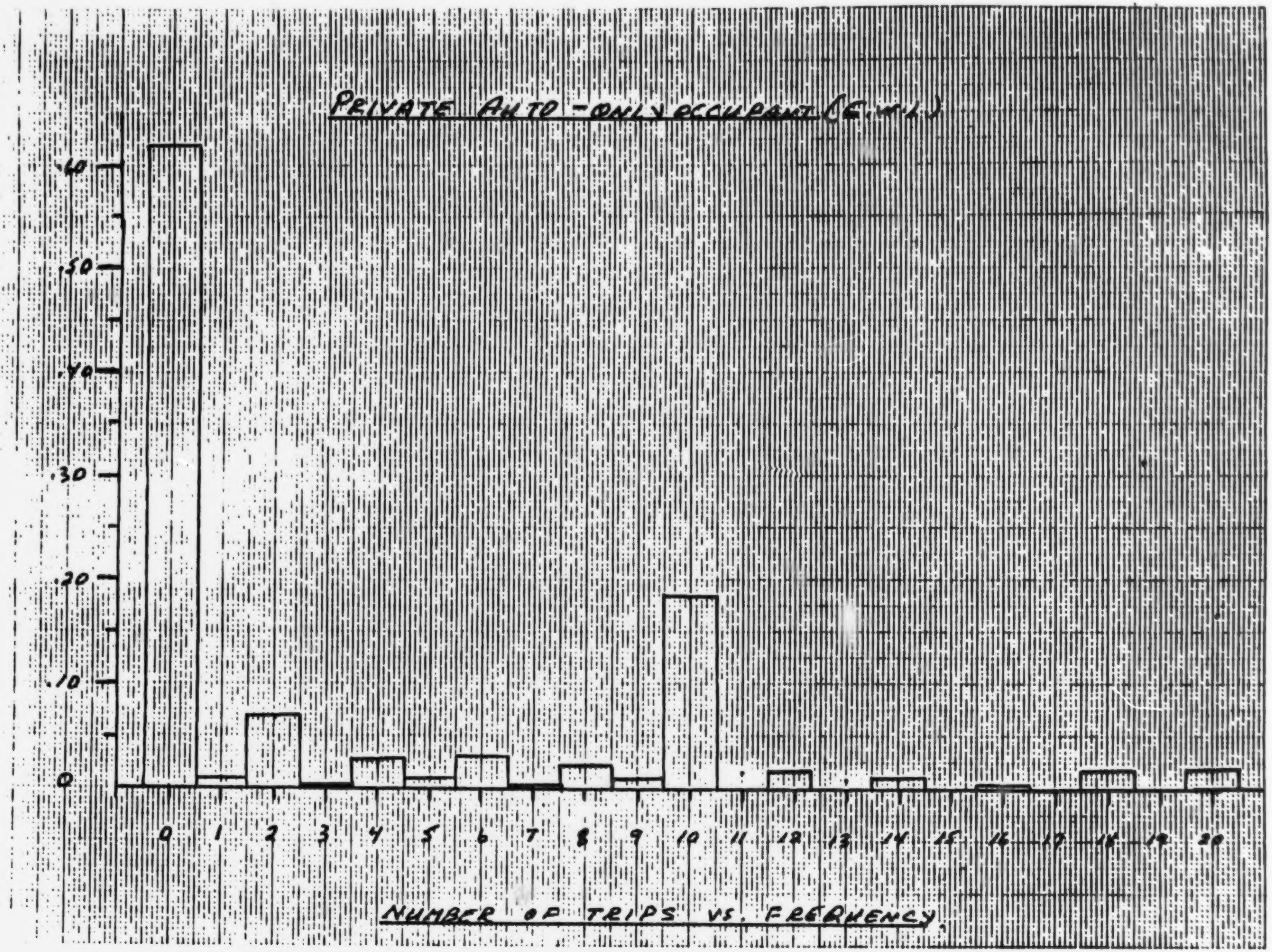
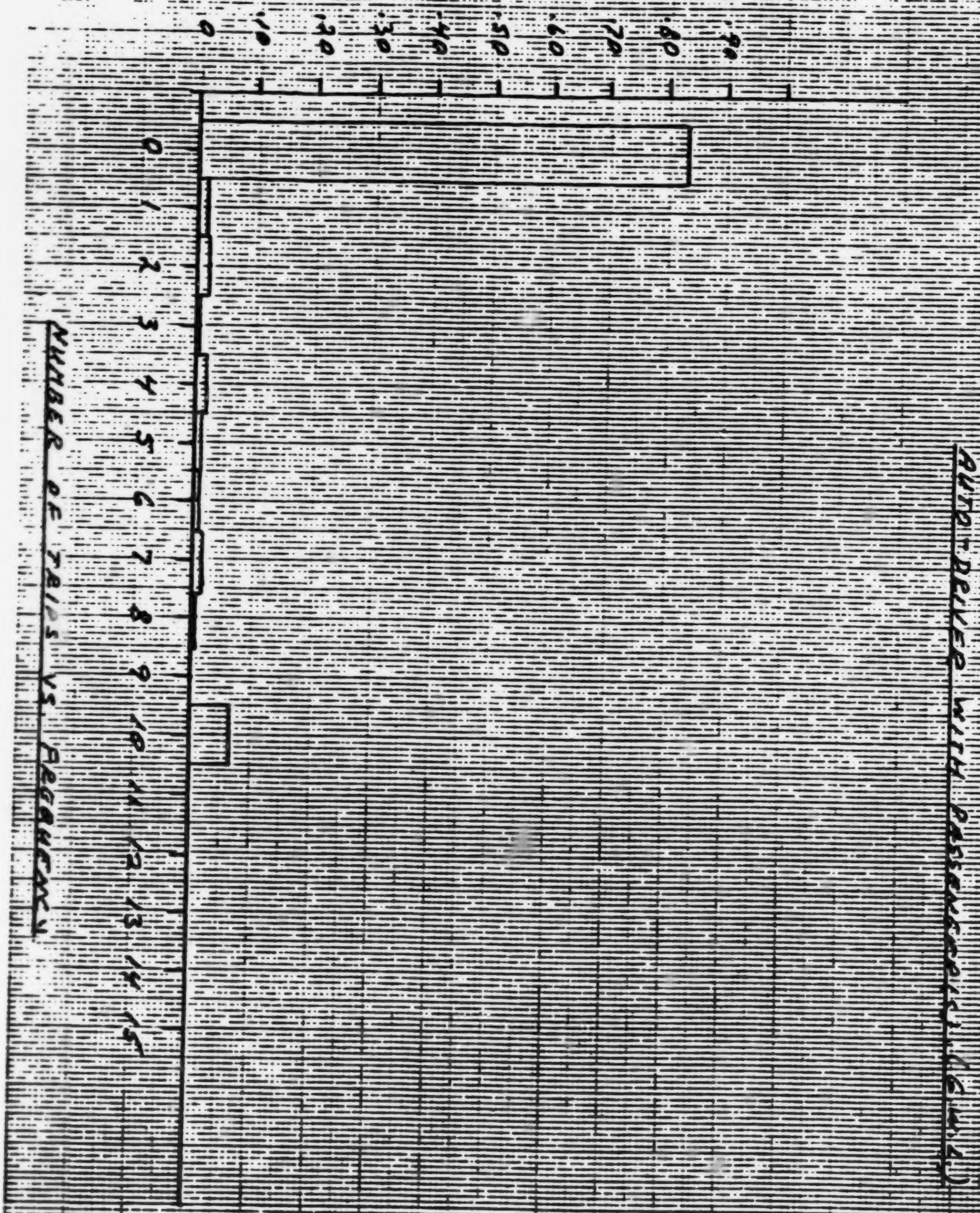

PRIVATE AUTO - ONLY OCCUPANT (G.M.L.)
.60
.50
.40
.30
.20
.10
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
NUMBER OF TRIPS VS. FREQUENCY
METRIC

Chart C-3


0
.10
.20
.30
.40
.50
.60
.70
.80
.90
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
NUMBER OF TRIPS VS FREQUENCY
AUTO-DRIVER WITH PASSENGER(S) (6 4 4)

METRIC

Chart C-4

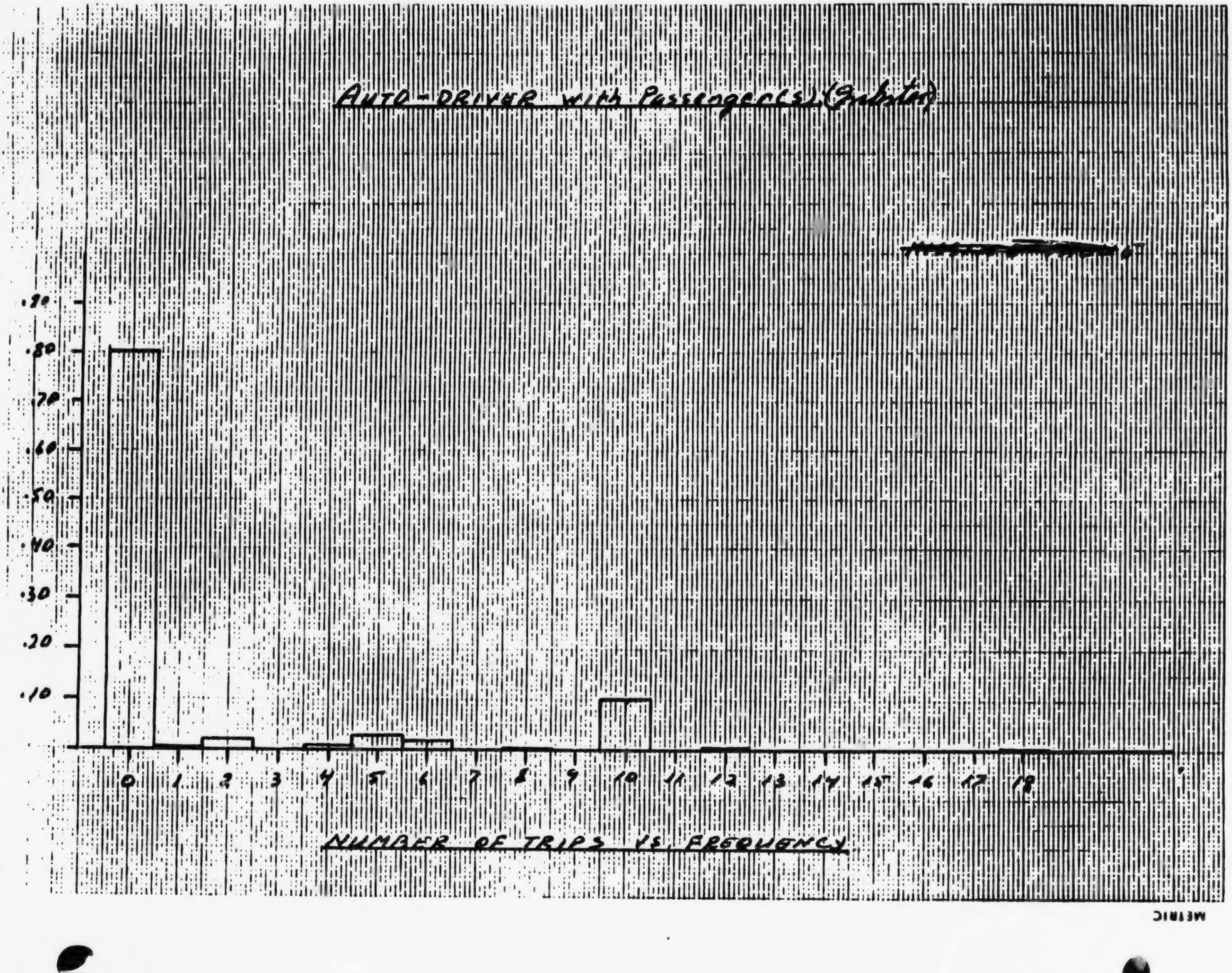

AUTO-DRIVER with Passenger(s) ([illegible])
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
NUMBER OF TRIPS VS. FREQUENCY
METRIC

Chart C-5

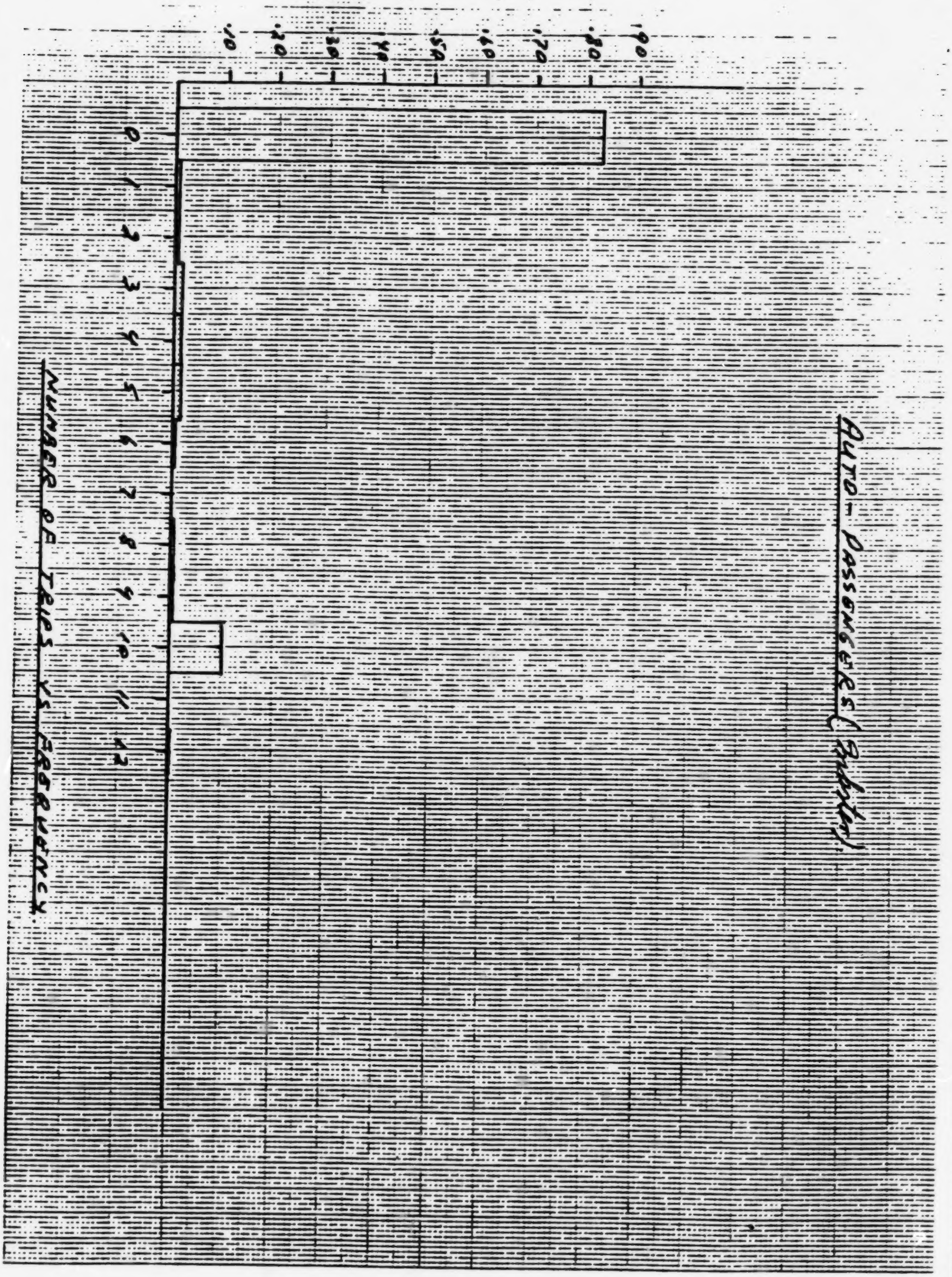

.10
.20
.30
.40
.50
.60
.70
.80
.90
0
1
2
3
4
5
6
7
8
9
10
11
12
NUMBER OF TRIPS VS FREQUENCY
AUTO-PASSENGERS ([illegible])
METRIC

Chart C-6

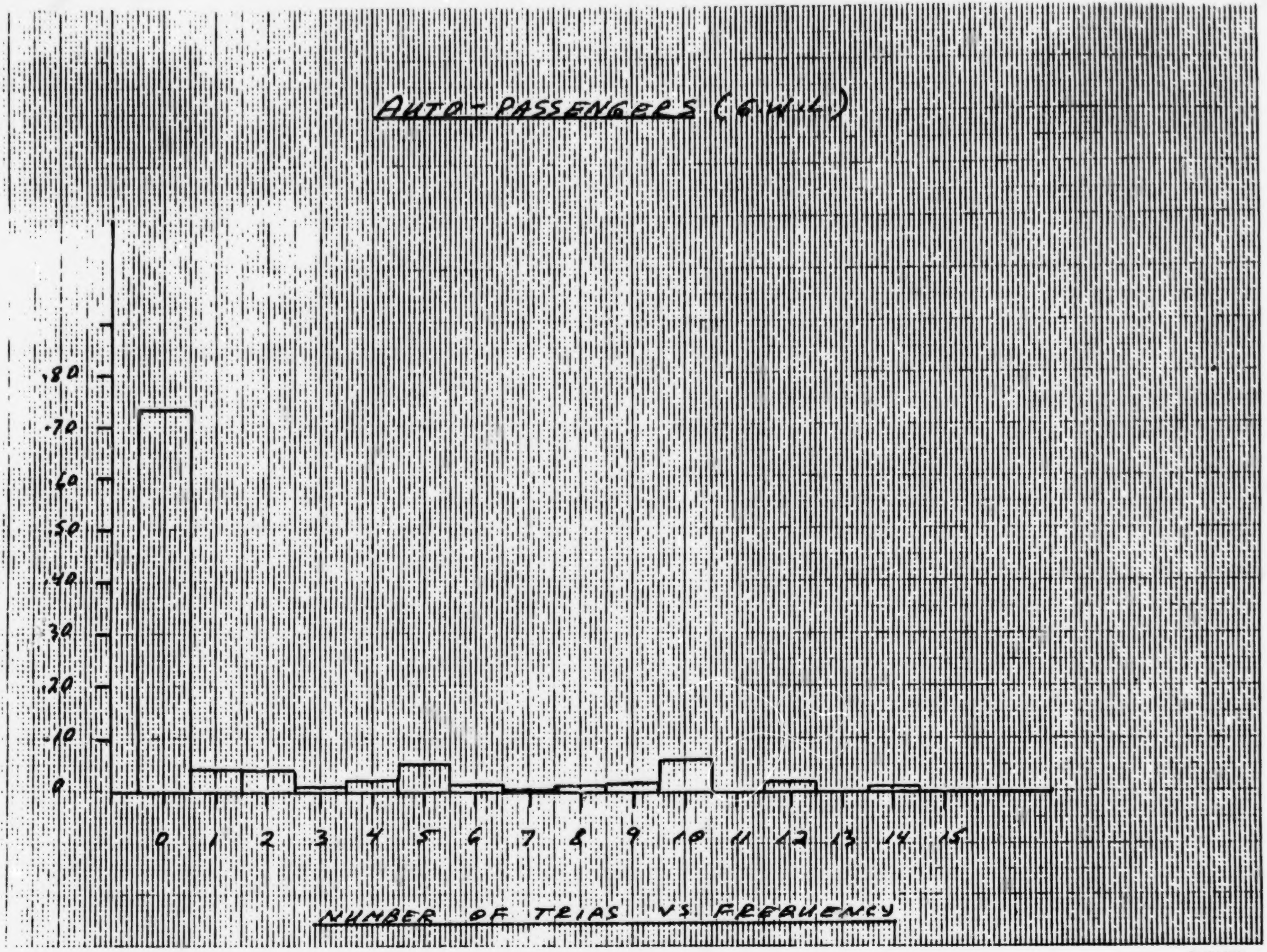
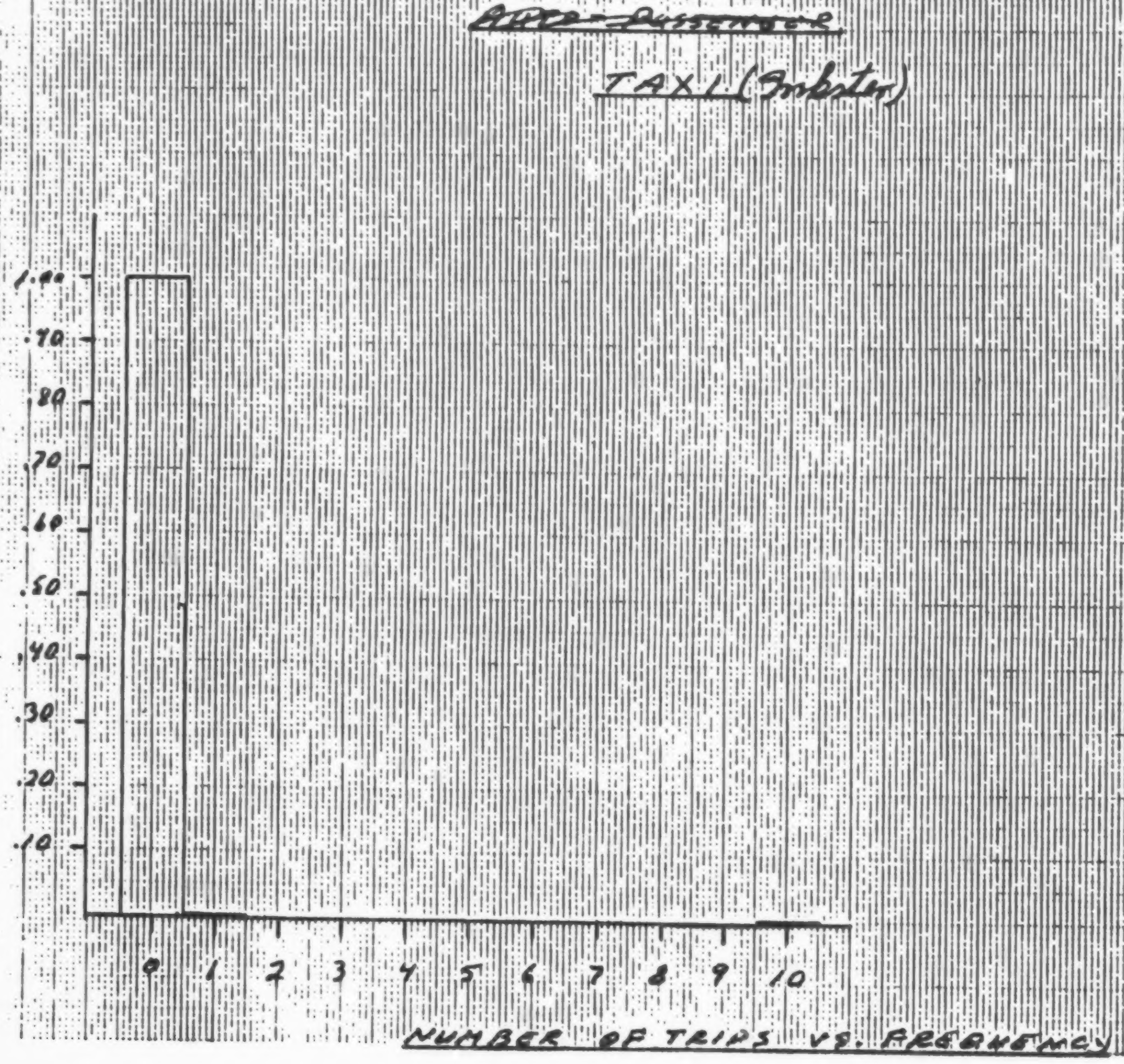

AUTO-PASSENGERS (G.W.L.)
.80
.70
.60
.50
.40
.30
.20
.10
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
NUMBER OF TRIPS VS FREQUENCY

Chart C-7



METRIC

Chart C-8

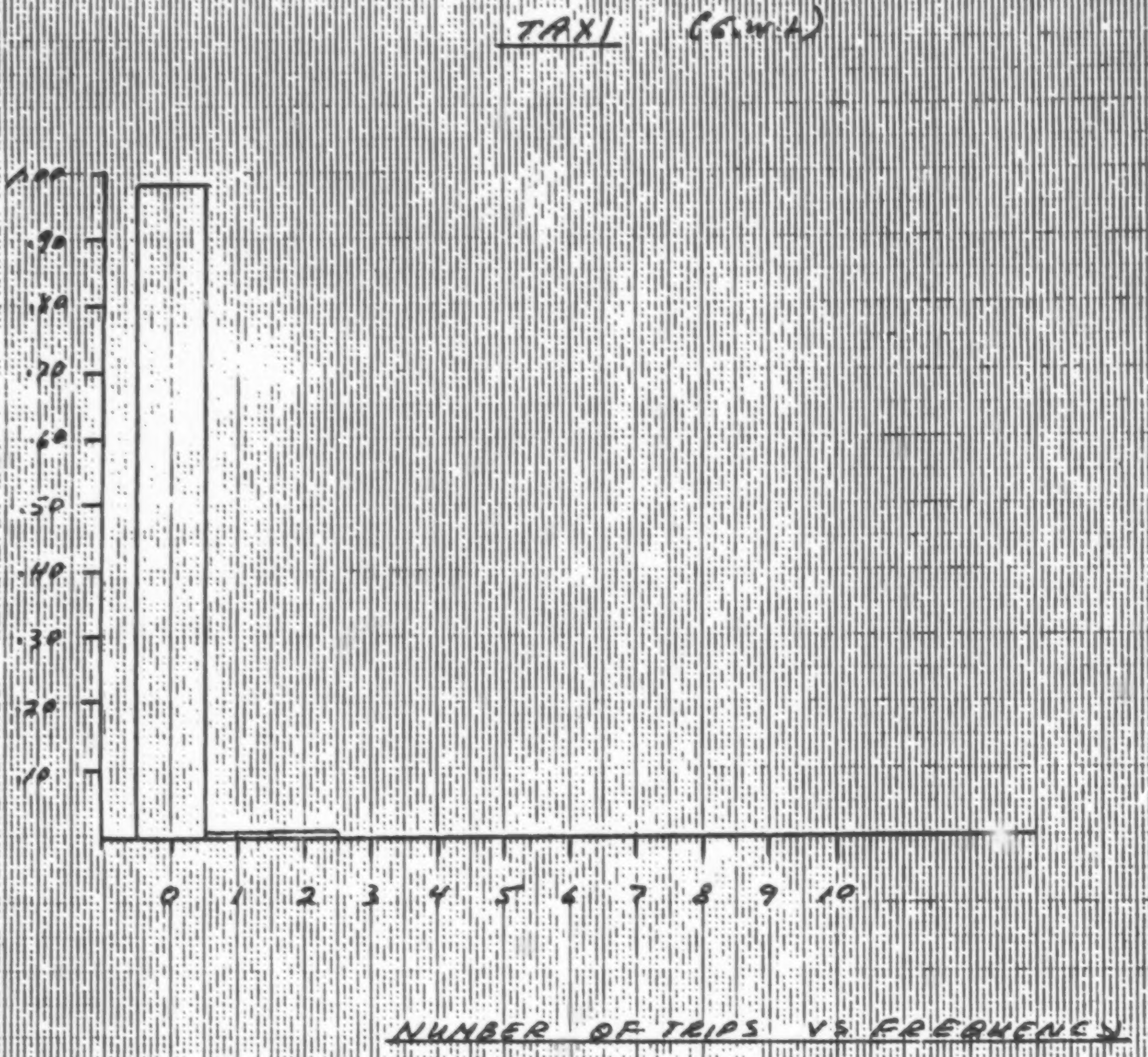

TAXI (G.W.A.)
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
0
1
2
3
4
5
6
7
8
9
10
NUMBER OF TRIPS VS FREQUENCY

Chart C-9

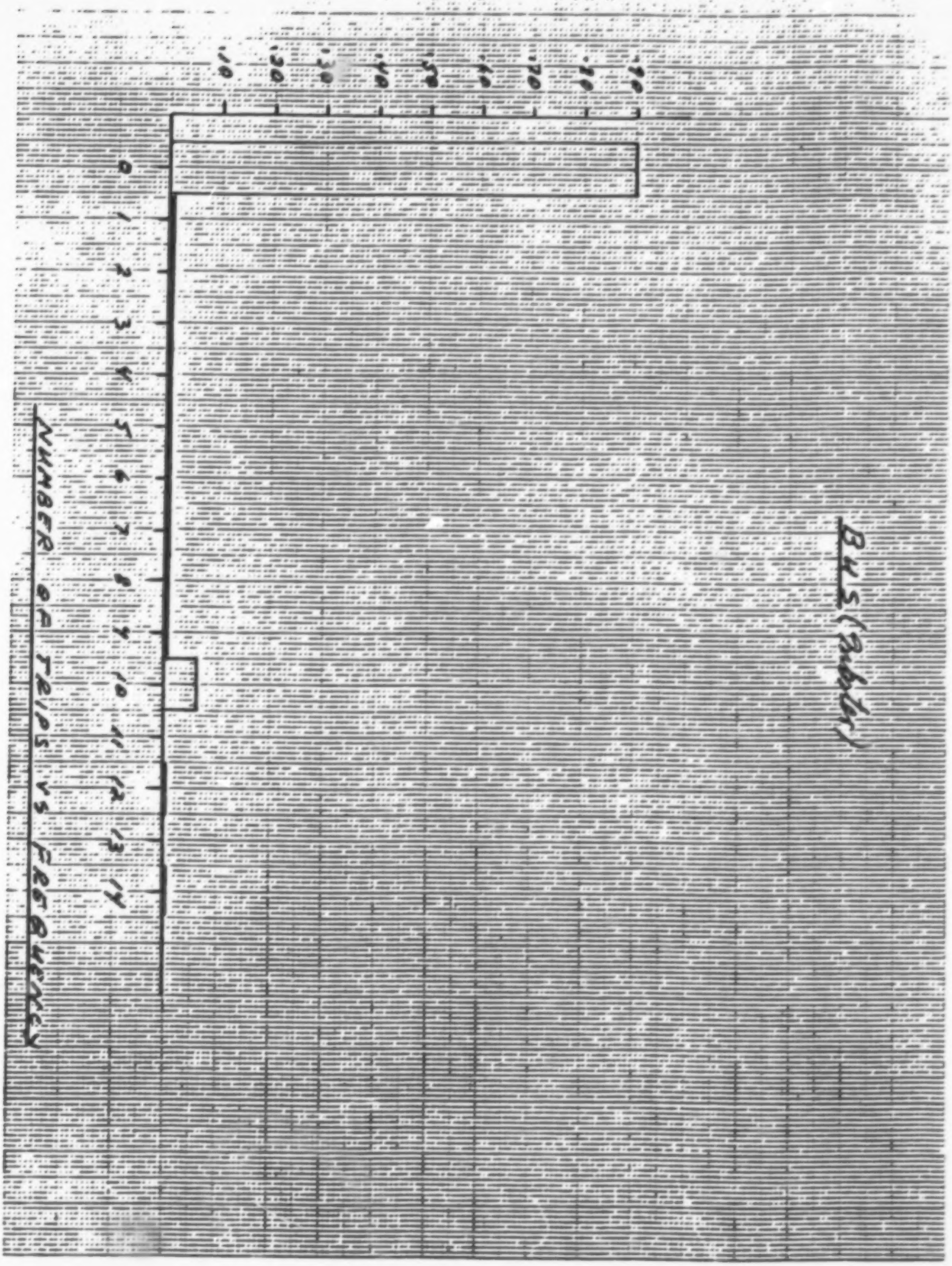

BUS (Subtotal)
NUMBER OF TRIPS VS FREQUENCY
.10
.20
.30
.40
.50
.60
.70
.80
.90
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
METRIC

Chart C-10

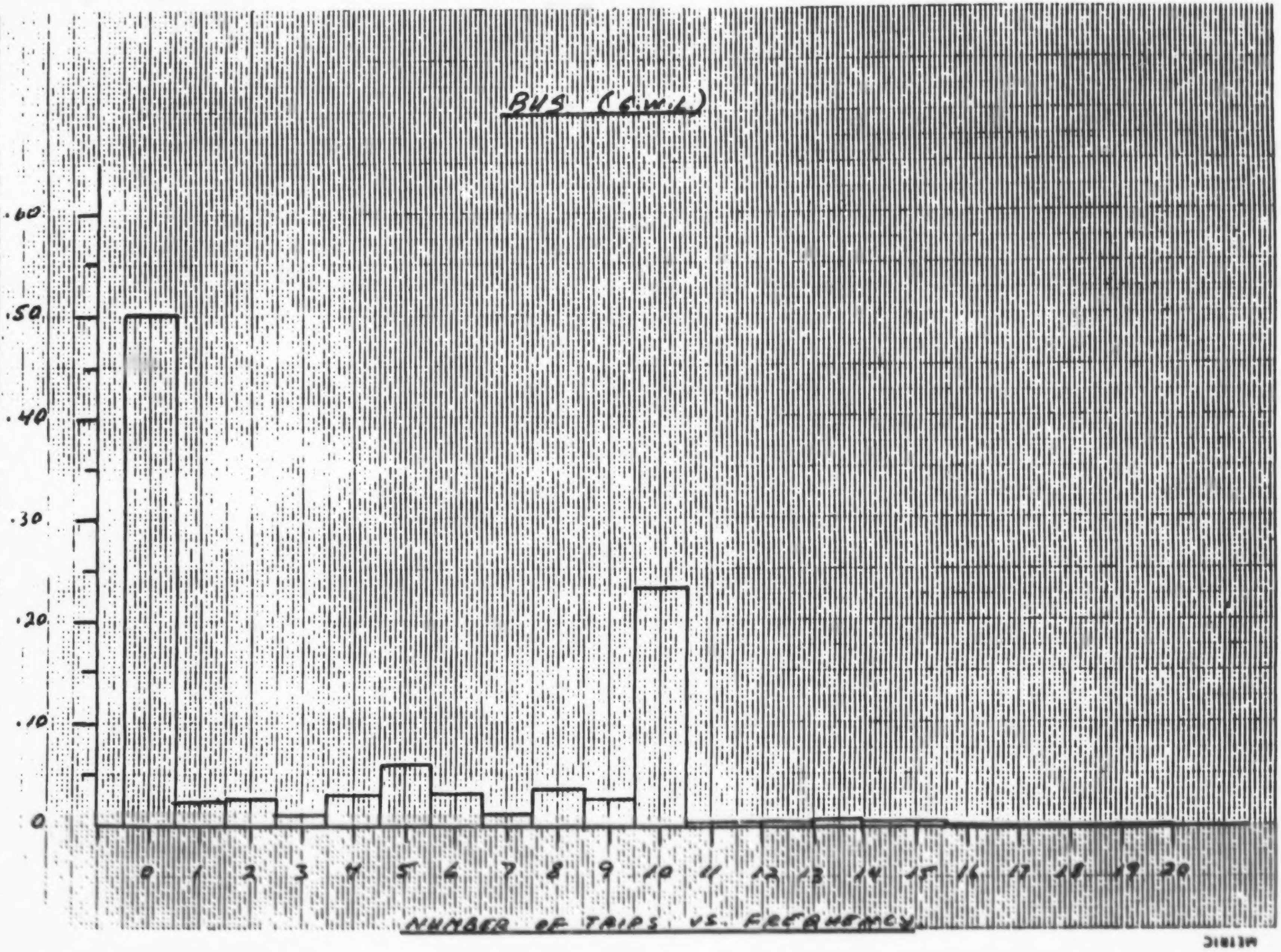
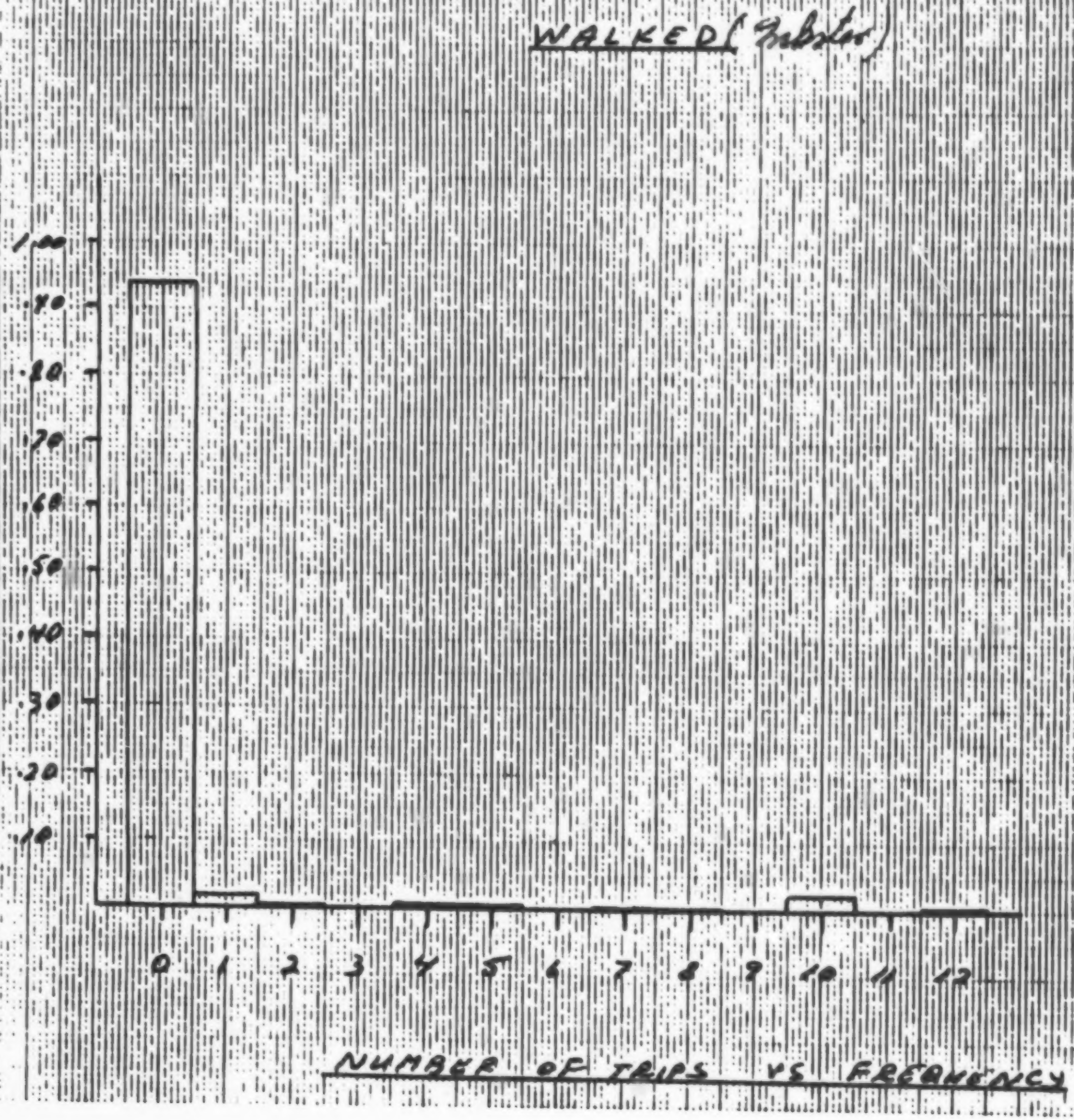
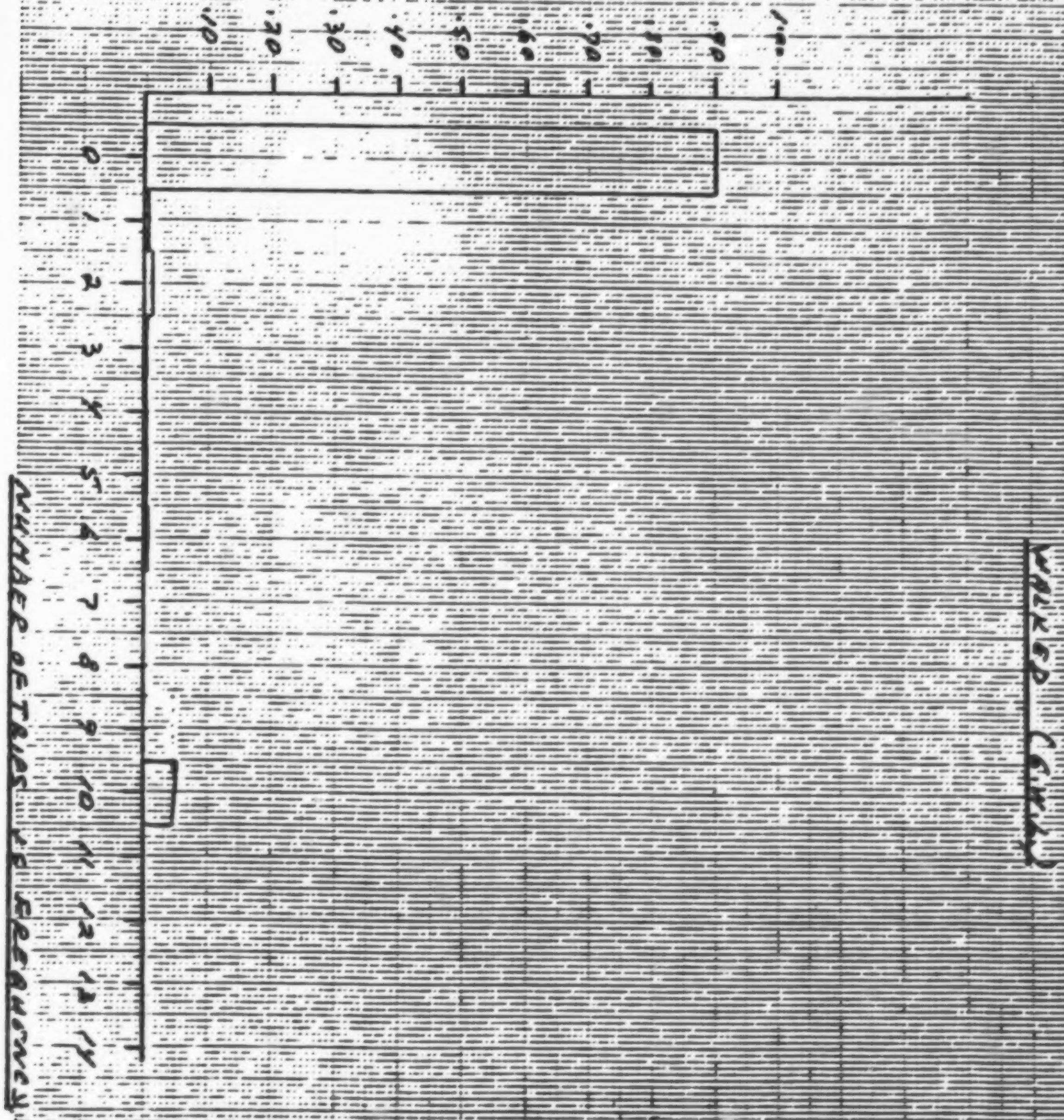

BUS (G.W.L.)
.60
.50
.40
.30
.20
.10
0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
NUMBER OF TRIPS VS. FREQUENCY

Chart C-11



METRIC

Chart C-12


.10
.20
.30
.40
.50
.60
.70
.80
.90
1.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
NUMBER OF TRIES TO FREQUENCY
WALKER (GIKKY)

APPENDIX D The Structure of the Preference Factors

Table D-1

Factor Structure for Inkster Park (Based on the Correlation Matrix). Correlation coefficients smaller than .200 are omitted.

	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8
1. Door to door transportation between home and work	-	-	.807*	.352	.219	-	-	-
2. Direct transportation without other stops	-	.214	.460	.710*	-	.203	-	-
3. Short travel time	-	-	-	.888*	-	-	-	-
4. Freedom to make stops on the way to (from) work	-	.890*	-	-	-	.299	-	-
5. Freedom to choose to go at different times on different days	-	.847*	.219	-	-	.308	-	.223
6. Freedom from having to drive	.795*	-	-	-	.284	-	.259	-
7. Prefer travelling with other people	-	-	.204	-	.805*	-	.204	-
8. Prefer to have travel arrangements handled by someone else	.472	-	-	-	.689*	-	.321	-
9. Total transportation expenses must be kept to a minimum	.595*	-.250	-	.418	.222	-.371	-	.212
10. Wish to have vehicle readily available	-	.354	.818*	-	-	.220	-	.203
11. Wish to be free of responsibility for vehicle maintenance and operation	.785*	-.305	-	.252	.262	-	-	-

Table D-1 (cont'd.)

	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8
12. Need space to carry packages	-	.343	.220	-	-	.857*	-	.226
13. Freedom from having to obtain parking space	.584*	-	.399	-	-	-	.578*	.363
14. Need transportation to and from work in off-hours (non rush hours)	-	.217	-	-	-	-	-	.940*
15. Must accommodate physical disability	-	-	-	-	.238	-	.926*	-
16. Prefer travelling alone	-	.303	-	-	-.320	.723*	.413	-

* Major characteristics of factor

Table D-2

Factor Structure for Great West Life (Based on Correlation Matrix). Correlation coefficients smaller than .200 are omitted.

	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8
. Door to door transportation between home and work	-	-	-	.651*	.335	-	-	-
2. Direct transportation without other stops	-	-	-	.297	.669*	-	-	-
3. Short travel time	-	-	-	-	.847*	-	-	-
4. Freedom to make stops on the way to or from work	-	-	.884*	-	-	-	-	-
5. Freedom to choose to go at different times on different days	-	-	.665*	-.258	-	.280	-	-
6. Freedom from having to drive	.399	.387	-	-.470	-	-	-	-
7. Prefer travelling with other people	-	.781*	-	-	-	-	-.326	-
8. Prefer to have travel arrangements handled by someone else	-	.834*	-	-	-	-	-	-
9. Total transportation expenses must be kept to a minimum	.673*	-	-	-	-	-	-.284	-
10. Wish to have vehicle readily available	-	-	-	.695*	-	-	-	-
11. Wish to be free of responsibility for vehicle maintenance and operation	.736*	-	-	-	-	-	-	-

Table D-2 (cont'd.)

	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8
12. Need space to carry packages	.252	-	.431	.322	-.236	.256	-	-
13. Freedom from having to obtain parking space	.787*	-	-	-	-	-	-	-
14. Need transportation to and from work in off-hours (non-rush hours)	-	-	-	-	-	.968*	-	-
15. Must accommodate physical disability	-	-	-	-	-	-	-	.980*
16. Prefer travelling alone	-	-	-	-	-	-	.907*	-

* Major characteristics of factor

POOR

QUALITY

ORIGINAL